DOCUMENT RESUME

ED 338 577 SP 033 356

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TITLE	Parent Involvement: Training Teachers To Facilitate Quality Mathematics Instruction in the Nonpublic Schools.
INSTITUTION	City Univ. of New York, N.Y. Center for Advanced Study in Education.
SPONS AGENCY	New York State Education Dept., Albany.
PUB DATE	Jul 91
NOTE	134p.; Appendixes comprise two-thirds of the document; they contain many pages of light and/or broken type.
PUB TYPE	Reports - Descriptive (141)
EDRS PRICE	MF01/PC06 Plus Postage.
DESCRIPTORS	Educational Objectives; Elementary Education; *Elementary School Mathematics; Evening Programs; Higher Education; *Inservice Teacher Education; Learning Activities; *Mathematics Instruction; *Parent Participation; Parents as Teachers; *Parochial Schools; Teacher Role
IDENTIFIERS	EQUALS Program; *Family Math (Equals Project); *New York (New York)

ABSTRACT

This teacher training project sought to strengthen mathematics instruction in New York City's nonpublic schools (NPS) by training elementary level teachers and administrators in "Family Math"--a nationally acclaimed program conceived by the staff of the EQUALS Project at the University of California at Berkeley. The program works through classroom teachers and brings parents and children together to do math in an interactive and positive environment. The 1-year pilot project consisted of three stages: orientation; staff training; and the development of a Family Math/NPS program in nine representative nonpublic, religiously oriented schools in New York City. The following are discussed in detail: project objectives; descriptions of project activities; and the impact and benefits of family math for teachers, parents, students, and the school. Nine appendixes include: (1) a description of the program; (2) details of inservice credit; (3) promotional materials; (4) a brochure describing Family Math in Nonpublic Schools; (5) NPS Orientation meeting materials and rating forms; (6) NPS training workshop agendas, materials, and rating forms; (7) observation schedule and teacher, principal, and parent surveys; (8) sample school agendas; and (9) an evaluation report. (LL)

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PARENT INVOLVEMENT: Training Teachers to Facilitate Quality Mathematics Instruction in the Nonpublic Schools

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CASE 10-91
JULY 1991

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This project was performed under a New York State Education Department grant, DDE Title II A, Project No. 132-91-0036

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The Graduate School and University Center
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FINAL NARRATIVE REPORT
FISCAL YEAR 1990-91

PARENT INVOLVEMENT: Training Teachers to Facilitate Quality Mathematics Instruction in the Nonpublic, Religiously-Oriented Schools in New York City

This teacher training project sought to strengthen mathematics instruction in New York City's nonpublic schools (NPS) by training elementary level teachers and administrators in "Family Math"--a nationally acclaimed program that brings parents and their children together to do math in an interactive and positive environment. The one-year pilot project consisted of three stages: orientation, staff training, and the development of a FAMILY MATH/NPS program in nine schools representing the diversity of the City's nonpublic, religiously-oriented schools.

The research data shows that parents can play a critical role in their child's education. Since parents can provide specific input as well as general encouragement in support of learning, more and more projects are being developed that provide them with materials and activities that they can use to reinforce the school curriculum. Teachers' attitudes toward parent involvement, however, and their expectations about parents' roles seem to be vital to the success of these efforts.

The Family Math project, as conceived and executed nationally by the staff of the EQUALS Project at the University of California at Berkeley, works through the classroom teacher. It accords teachers a major role in forming Family Math groups of parents and children and in conducting activities with them. In part because of its collaborative nature, there is evidence that Family Math reaches the "poorest, the most remote, and . . . typically overlooked" parents as well as those traditionally more connected to the schools; helps parents and schools build more constructive relationships; leads to changes in attitudes toward math on the part of teachers, parents, and students; and results in the incorporation of a new, problem-solving focus into the classrooms of participating teachers. In addition, even after the project, parents continue to engage in Family Math activities with their children; and most teachers report

engaging in more "thinking" math and hands-on activities in their regular classrooms. Indeed, the effects of participation in Family Math on teaching behavior is one of the program's significant outcomes. But it is the confluence of effects on teachers and administrators and on parents that helps students learn new techniques and skills, improve their attitudes toward math and their level of confidence, and otherwise respond positively to the mathematics curriculum and the State-mandated mathematics syllabus. A brief description of the national Family Math program is appended (Appendix A).

PROJECT OBJECTIVES

Through inservice training of teachers (and others) in the Family Math philosophy and activities, this project sought to improve and extend the teaching skills and hence the quality of mathematics instruction in the City's nonpublic schools. Equally important was involving parents meaningfully in their children's education. These broad-based goals were operationalized through:

- meetings of the advisory group, composed of the Project Director; Director of CASE; University Dean for Community Development; NPS teacher representatives; experts in parent involvement programs; and representatives of the major, religiously-oriented systems of schools in New York City: Agudath Israel of America, the Board of Jewish Education of Greater New York, the Catholic Archdiocese of New York, the Catholic Diocese of Brooklyn, and the Greek Orthodox Archdiocese;

- the introduction of formal parent involvement in mathematics programs to the NPS in New York City, with emphasis on Family Math. This involved:

  - preparing descriptive recruitment materials; and

  - conducting an orientation meeting for NPS administrators, mathematics coordinators and/or curriculum supervisors, teachers, and NPS parent liaisons and/or leaders of parent groups.

- the conduct of Family Math Teacher training workshops to train selected teachers and others, including supervisors and parents, in forming Family Math groups and in conducting FAMILY MATH programs in the schools;

- the provision of technical support by CASE to the demonstration schools to help them:

  - design individualized, school-based FAMILY MATH programs of approximately six sessions; and

- conduct FAMILY MATH programs during the Spring. Schools were also encouraged to assess their programs and to plan revisions for future cycles based on their 1990-91 experiences; and

- the dissemination of the results of the project.

As will be shown below, these objectives were achieved: the advisory group continued to meet and have input into the recruitment process and the selection of schools; an orientation meeting in November 1990 attracted the interest of 61 people from 35 different NPS; 24 people from nine schools expressed interest in holding a FAMILY MATH program and 21 attended the two-day Family Math Teacher training workshop on January 9 and 10, 1991; and eight schools conducted FAMILY MATH activities for parents and children during the Spring.

To gauge the effectiveness of these outcomes, project staff and consultants, including the national Director of the Family Math program, CASE's parent involvement program specialist, and the external evaluator, undertook a formative and a summative evaluation. Copies of minutes and agendas of meetings, correspondence, and program proposals and projected activities were maintained and reviewed. Feedback was obtained from the advisors, trainers, and teachers who participated in the training workshop. This was augmented by the reactions of school principals, trained Family Math Teachers, and parents. FAMILY MATH sessions in the schools were observed and school personnel interviewed in-depth. Copies of the evaluative instruments, Feedback Forms and Reaction Surveys, are appended.

DESCRIPTION OF PROJECT ACTIVITIES

The project activities, as noted, may be classified into three stages: orientation, training, and demonstration in the schools. The major endeavors and outcomes are summarized below.

Orientation

Several critical activities took place prior to the Orientation meeting on November 15, 1990, all aimed at enlisting the interest of schools, recruiting participants, and obtaining a commitment

from them to consider implementing a FAMILY MATH program during the Spring 1991.

A project advisory group was convened to include, together with project and CASE staff and consultants and teachers from the NPS, representatives of the major religiously-oriented systems of schools in New York City. (See above for the specific school systems represented.) Also included was a Woodrow Wilson fellow, a teacher new to the City's Catholic schools, who was interested in furthering the Family Math program in the New York area. A formal meeting with the full complement of advisors, held in mid-September, was followed up during the year with discussions with individual members.

The advisors helped formalize the recruitment process and plan the details of the program operation. Discussions focused on the needs of the constituent nonpublic schools and systems of schools for programs that involve parents in math education; ways to increase the likelihood that the schools could take advantage of such opportunities; and the strengths and drawbacks of various parent involvement programs currently available. Also talked about were guidelines for school recruitment and criteria for selecting demonstration schools and how the advisors could best support program implementation in these schools. As one way of encouraging schools to participate, the Director of Program Management, Office of Catholic Education, Diocese of Brooklyn, agreed to award "Professional Development" credit to participants who completed the 2-day January workshop training program. (Appendix B.)

The recruitment process started in early September with SAVE-THE-DATE notices sent to the principals of the religiously-oriented schools. (See Appendix C, "Family Math Opportunity" and "What is Family Math?"). Up-to-date lists of schools were provided by the advisors and included 202 schools affiliated with Agudath Israel and the Board of Jewish Education[1], 150 schools in the New York Catholic Archdiocese, 178 schools that are part of the Catholic Diocese

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[1]Incomplete lists, resulting from staff turnover in one organization, meant that we did not contact all the Jewish schools in New York City; missing especially were schools affiliated with Conservative and Reformed Judaism.

of Brooklyn, and 11 Greek Orthodox Archdiocese schools.

Also in September, NPS principals received a specially-designed brochure (Appendix D) providing details about the Orientation meeting and Training workshop; for three of the systems of schools, a letter from the advisor accompanied the mailing. Contacts were also made with individual schools that had expressed an interest in or participated in CASE's earlier NPS projects.

As a result of these efforts, 61 people from 35 different schools said they planned to come to the Orientation. Thirty-nine people (principals, teachers, and parents) from 26 different schools, including five people (from four schools) who were not expected, actually attended.

Present at the November 15, 1990 Orientation meeting were 18 principals, assistant principals, or math supervisors; and 11 teachers. There were, in addition, three parents who came with the school personnel, as well as seven other people whose titles were not known. The purpose of this meeting was to help school administrators decide whether to take part in the FAMILY MATH project as demonstration schools--that is, as schools committed to establishing a FAMILY MATH cycle in the Spring for parents and their children.

The Orientation focused on FAMILY MATH in the NPS and included an overview of parent involvement in mathematics programs, including research data describing their impact (presented by CASE's parent involvement program specialist); an introduction to sample Family Math activities (led by a Board of Education district math coordinator); and information about the training workshop. Schools were also told that participants were expected to consider mounting a FAMILY MATH program in their school later in the year. Two advisors attended the Orientation and spoke to the participants, suggesting possibilities for program support. (Handouts for the Orientation meeting, including Feedback Rating Forms, are attached, see Appendix E.)

Although only approximately six percent of the total number of schools contacted about the

Orientation signed up to attend, with a somewhat smaller percentage actually coming to the meeting, enthusiasm among participants was high. They rated the session 4.4 overall, between "good" (4.0) and "excellent" (5.0 on a 5-point scale where 1.0="poor"). They told us that the Family Math concept was "exciting", "interesting", and "fabulous". They thought it was "valuable to involve parents" in education--especially in a "hands-on program"--and they liked the idea that it could be implemented with minimal out-of-pocket expenditures on their part.

Not surprisingly in light of all of the positive comments, respondents rated their interest in conducting a FAMILY MATH program a 3.6 on average, on a 4-point scale where 1.0 was "not interested" and 4.0 was "very interested". Almost every principal in attendance was determined to try to bring Family Math to his/her school, "sign us up now!", and all of the teachers that were there said they would bring the program to the attention of their school administration and parent association.

Because attendance at the Orientation was made a prerequisite to participation in the teacher training workshop (we wanted to insure the schools' commitment to trying Family Math), and participation in the training workshop was necessary for CASE's support of the schools' FAMILY MATH program, initial interest on the part of the school was extremely important. As a result of the Orientation, six schools expressed a strong desire to be part of the program; these schools, plus an additional 20 others that had indicated some interest in being part of this initial demonstration, met the criteria established by the advisors (interest in the program, diverse representation of various religiously-oriented systems of schools, and geographic diversity). These 26 schools were subsequently invited to take part in the two-day teacher training workshop, held on January 9 and 10, 1991.[2]

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[2]In addition to the NPS who attended, FAMILY MATH/NPS attracted the interest of the Jewish Education Center (Elizabeth, NJ), the Prospect Hill Elementary School (Pelham Manor, NY), the School for the Deaf (New York, NY), and the Queens College/CUNY Elementary Education-Mathematics Department.

Training Family Math Teachers

The Family Math Teacher training workshop, planned by project staff and consultants, was led by the national Director of the Family Math program who was brought to New York from California to lend her prestige and expertise to the program and to establish its legitimacy in the NPS community.

A total of nine schools and 21 different people took part in the training and subsequently in the demonstration. This included the principals and vice principals in the case of five schools, together with the teacher and parent representatives (4 schools); paired teachers (2 schools) and parents (one school); and single teachers (2 schools). One of these schools had taken part in CASE's previous programs promoting quality mathematics instruction; the others were new to this project. All boroughs except Staten Island were represented, as were the Catholic and Greek Orthodox systems of schools.

As noted, the training of FAMILY MATH/NPS Teachers took place from 8:00 a.m. through 4:00 p.m. over the course of two days in early January. Like the Orientation, these meetings were held at the CUNY Graduate Center in mid-Manhattan. In addition to the participants and the trainer, other people who came to all or part of these sessions included an assistant to the trainer, project staff and consultants, other CASE personnel, and the SED project officer.

The participants were seated at tables and worked on the activities in pairs and/or in school groups. The ambiance was informal and included breaks for refreshments and lunch. Questions were encouraged and participants shared their experiences and plans. Agendas summarizing each day's activities can be found in Appendix F, together with samples of selected activities and the Workshop Rating Forms.

As can be seen from perusal of the Day 1 agenda, the first day was devoted almost entirely to experiencing a selection of Family Math activities, all of which can be found in the Family Math book supplied to participants. Working individually, in pairs, and/or in small groups, the 21 teachers, principals, and parents who came to be trained as Family Math Teachers went through

a typical session, as conducted by the leader who first set the stage and gave them a short history and brief overview of the program.

The workshop was set up to model how a session in a school would look and operate. The leader demonstrated the leadership role the participants would be taking with their group of parents and children, and she started by greeting them, putting them at ease, and encouraging them to work on the "openers"--that is, those activities set up on tables around the room that not only "break the ice" at each meeting, but that also can be "played" individually and at home.

As the day progressed, the leader (i.e., the national Director) made explicit both the administrative details that participants needed to be aware of in running their programs (such as scheduling breaks, regrouping people for different activities, and so on) as well as the underlying substantive issues. These included discussing the mathematics involved in an activity (e.g., "we just did an activity that involved estimating, counting, predicting") and attending to the communication and interaction that takes place between parent and child.

Day 1 was quite successful as indicated by the participants' overall average rating of 4.5, midway between "good" and "excellent". Several of the specific activities, also evaluated on the same 5-point scale, received high ratings as well: the "modeling of a session", 4.4; the "openers" 4.6; careers that involve mathematics, 4.5; and the activities that involved geometric concepts and principles, 4.3.

When asked specifically what they liked about the first day's training, participants indicated that they gained new information (74%); heard ideas presented in new ways (58%); were exposed to a knowledgeable (95%) and well-prepared presenter (89%); received practical (79%), exciting (63%), and useful materials (89%); and obtained ideas that they could use immediately (79%). They supplemented these ratings with comments, including: "I'm enthused to impart this know-how to parents and children"; "There are many creative ideas to use"; "I am thoroughly impressed with content areas and approach"; "I learned more interesting ways to teach multiples, divisibility, measurement"; and "I personally was relaxed".

Respondents offered a variety of answers about the day's two most useful ideas, concepts, or activities. The penta-square or pentaminos activity was listed most often, followed by (in decreasing order of frequency) the "math in careers" talk, and the 2- and 3-bean salad. The 99 and the 100 charts were also listed, as were double digits, cover patterns, openers, and the balloon ride. Cut-a-card, word values, tens and ones, and word problems were each mentioned by one person.

Among the few items listed as "least useful" were many of the same exercises--pentamino, number activities, stories with cards, card cutting, and the list of jobs based on the math skills involved. One person took this opportunity to state that she "found the workshop too long", while another respondent told us that it was too short--she didn't have enough time to try all of the openers. Three people felt there was nothing that wasn't useful--"everything was useful" and "I don't think there was any such thing."

We also asked participants how interested they were in conducting a FAMILY MATH program in their schools. Interest ran very high, averaging 3.9 on a scale where the top value, 4.0, was "very interested". They explained their interest in terms of personal reasons ("I don't want my child to dislike math as I do"), organizational reasons ("I think I'll be able to get parents organized"), and reasons that reflected the program's general goals, including: "It would give parents and students an opportunity to work and learn new ideas together", "I would like to be part of a program that helps parents realize math is not 'mysterious' or as difficult as they thought", "To relieve some of the anxieties parents might have about math", I would like to see more parents get involved with teaching and sharing math time with their children", "My parents and children need it", "Children and parents can both learn from this", and "It will definitely bring the family and school community together". One person's statement summarized the general reaction:

> The parents would become involved with teachers and [with] their children in a very productive way. Math is one of the most difficult subjects in school for children and this program is a great step for opening communication and involvement.

When asked, "What additional support or information do you need to set up a FAMILY MATH program in your school?", respondents indicated that they'd "like to see [what] problems other schools have encountered in the past and how they worked through [them]", I need "More information [about the project] for junior high school-age children", and "Any information available focusing on junior high material [would be useful]." One person wanted details about "Where/what subject to start with and where to progress", while another participant wanted to hear more about "the actual developmental progress from one week to the next"--the sequence of events that should occur and whether the order in the Family Math book should be followed or if or they should "create our own schemata?" One of the teachers needed to check with her principal, while another one wanted to visit a site that was conducting a session and, perhaps, "take my principal to observe" it.

Day 2 was organized in a manner similar to Day 1. Again, most of the day was devoted to working on Family Math activities, but some time was spent on "housekeeping" and on the business of planning a program and preparing for the sessions (see Appendix F). The Project Director talked about how CASE would support school programs during the Spring and some alternate funding possibilities were also discussed.

If anything, participants were even more enthusiastic at the end of Day 2. The session received an overall rating of 4.8 (5.0="excellent"), and 88 percent of the respondents gained new information; heard ideas expressed in new ways, 63%; interacted with a knowledgeable, 94%, well-prepared presenter, 100%; received practical, 94%, exciting ideas, 88%; useful material, 81%; and learned about ideas that they could use immediately, 81%. Some typical comments were, "I felt very relaxed and confident"; "I'm eager to help parents/students"; and "It was wonderful!"

Participants gave a wide range of answers about which two of Day 2's ideas, concepts, or activities were the most useful. Calculators was mentioned most often, closely followed by fraction kits. Create-a-puzzle was listed twice, as was jigsaw. Mentioned once were graphing to find Hurkle, rainbow logic, two-dimensional Nim, addition game, target addition, and

estimation. The following activities, also assessed on a 5-point scale (1.0="poor"; 5.0="excellent"), received high ratings: fraction kits, 4.8; jigsaw, 4.3; calculators, 4.6; planning, 4.4; and create-a-puzzle, 4.5. (None of the participants had anything to offer concerning the "least useful" activity, indicating that they all viewed everything as worthwhile.)

Although they felt good about the training and confident about themselves, there were some indications that there was other information and skills participants needed in order to be able to implement FAMILY MATH is their schools. For example, they wanted lists of the "more enjoyable" activities and openers; a promise of a school visit by CASE project staff to see if the program was being conducted as well as possible; a presentation by the CASE project director at a PTA meeting to spur recruitment; opportunity to consult with CASE staff; more information on how calculators can help children; ideas for planning and handling the logistics of a FAMILY MATH program; and the best format for meetings, especially for the first meeting. Some participants noted that all of their questions were answered during the two-day workshop and one said that the planning time that was built into the workshop was particularly helpful.

Certain immediate steps needed to be taken, however, in order to initiate FAMILY MATH in the schools. Some people needed to speak to the principal. One person wanted to see how many parent participants there might be and the ages of their children. Another participant said she would speak with the other teachers in the school before deciding on which grades to involve, when, and how. Several people mentioned wanting a preliminary meeting with parents. They also wanted to review the Family Math book and draw up lesson plans; consult with the school board; study the activities and make the materials; send letters to parents; and sequence the approach--plan the order of events; and send out recruitment questionnaires to determine the optimal time and grade level.

Their spontaneous written-in comments were very positive. They suggested that participants thoroughly enjoyed the training workshop and the major presenter and came away having had fun and having experienced creative ways to teach mathematical concepts. Several thanked the project staff for the outstanding information, terrific atmosphere, and opportunity to make new

acquaintances. As one participant expressed it, "Thanks a million; this is a great program and I'm excited to get started".

Demonstration in the Schools

Five of the nine schools did, indeed, get started quickly, initiating fully developed 5- to 6-session programs almost immediately. Two other schools held orientation meetings for parents, one of whose principals assured us she had received "very good" feedback about the program, had talked about it to her colleagues in other schools, and would--in 1991--"start in September by arranging a schedule and publicizing this worthwhile program more." One of the remaining two schools did not do Family Math this year, despite the continued interest of the teacher who we trained. She assured us, however, that she's "doing the activities in class" and is "still working" on a parent-child program, although she has not yet followed up on our offer to meet with her and the principal.[3] The other school's failure to start a FAMILY MATH program is also not understandable, given the fact that five people (two teachers, two parent leaders, and the principal) attended both the Orientation meeting and the Training workshop, at both of which times they were enthusiastic about the program. Their explanation for their "slow start" had to do with personal problems of the teacher who was to have had the primary role in forming and teaching the groups. (Interestingly, this principal states that the school is, in fact, doing "Family Math" with individual parents and their children "when they come in to meet with the teachers".)

In the remainder of this section we will present case studies of how FAMILY MATH/NPS operated in seven schools, starting with a brief overview of those sites that conducted parent orientations. The data is based on observations conducted by project staff (see Appendix G for a copy of the Observation Schedule), supplemented by the responses to questionnaires

[3]At the time of the training workshop, this teacher informed us that her attendance at the program did not have the principal's full support because of the "difficulty in covering my class for these two days". However, it is likely that the principal has not been excited by the Family Math approach and philosophy.

administered to teachers and principals (Appendix G). Note that the participants-observers felt that they "became a member of Greek, Irish, Italian, Puerto Rican, Caribbean, Asian, and African families" during FAMILY MATH sessions.

School A, a participant in all of CASE's earlier projects involving the NPS in New York City, continued their active involvement, sending two teachers and two parent leaders to the training workshop. Although the teachers intended to conduct a Family Math program, it was postponed to later and later in the school year as a result of the teachers' involvement in the school's International Festival and their spring recess holiday plans.

Invitations to attend an orientation at the school was sent to the parents of fourth and fifth graders in May 1991. Fourteen parents (mothers) attended the meeting held during the school day from 10:30-11:30 a.m. Both teachers and both trained parent leaders led the meeting, explaining the Family Math program and introducing three sample activities: Value of Words, Find the Digits, and Double Digits.

The idea behind Family Math and the sample "games" were very well received by parents. As importantly, however, the leaders' confidence as Family Math Teachers (which had begun to erode due to the long delay between their training and their actual contact with parents) improved markedly as a result. A full cycle of FAMILY MATH is now being planned for the Fall, to take advantage of all participants' happy experiences with the orientation and the active support of the principal.

One of the important things illustrated by the school A experience that should be stressed in more detail in future training workshops has to do with elementary teachers' anxieties about making presentations to parents, many of whom are reported to have strong backgrounds in math and science. Almost all of the teacher participants expressed some feelings of reserve about this, although they later told us that "actually doing it wasn't as bad" as contemplating it in advance. Indeed, there was no instance in which a teacher felt threatened or intimidated. Training workshops should, therefore, make these "worries" explicit as they attempt to reassure the

teachers and bolster their confidence.

School B sent one teacher to the training workshop, despite reserving two additional places for parents (one of whom was a teacher on leave), neither of whom were able to attend. This was unfortunate because, despite the teacher's high level of commitment and the great amount of technical support the project staff provided to him and to the school generally, his lack of experience in school situations hampered his efforts (and good intentions!).

From the start, it was evident that this teacher, who was in his first year of teaching with no prior pre-service training in education, did not completely grasp the concept of how a "special" project might operate. Nor did he understand the specific constructs of the FAMILY MATH project. From review of his School Planning Form, it was apparent that he did not appreciate the necessity of limiting the target group to one or two contiguous grades, nor the desirability of having the same small group of parents and children meet over the course of several sessions. The two meetings that school B convened reflect this confusion.

Within two weeks after the training workshop, school B conducted its first evening meeting at the school, described as an orientation, which was attended by approximately 30 parents, the teacher, and the principal. Led by the trained teacher, the parents tried out three activities--estimating the number of kisses in a jar, the Value of Words (which someone from the audience helped translate), and a Venn diagram--and discussed what Family Math was about. They reacted very positively, although several fathers expressed concern about whether their participation in FAMILY MATH would ensure their children a place in New York City's "specialty high schools"!

Following this meeting which went fairly well considering that this was the teacher's first experience in front of a group, project staff helped him shape an ongoing program which would draw upon those parents who participated in the orientation. The second meeting of parents held on March 8 contributed to the confusion. For this meeting, the principal invited all of the school's 90 families (expecting 50 or so) to "a very important meeting on how to help your

children acquire math skills at home in support and as follow-up to what the teachers are struggling with in class. . . ." However, the teacher and project staff had been planning a Family Math workshop session for 40 parents and their children. Our parent involvement program specialist came to this meeting at the invitation of both the teacher and principal.

Approximately 35 parents (32 women, 3 men) attended, three of whom brought their pre-K, K, and third grade child. All of the school's teachers also came. The meeting lasted for more than two hours and was introduced by the principal. The parent involvement specialist then talked about the history, goals, and importance of Family Math which was translated by the principal and by a parent. Two activities were also demonstrated, the Hundreds Chart and the Balloon Ride.

Although the audience enjoyed these activities, and parents were urged to go try them at home with their children, it was obvious that this meeting was more of a "second orientation" than it was the first in a series of meetings comprising a Family Math program cycle. Most of the difficulty came about as a result of the teacher's incomplete understanding which was reinforced by the principal's interest in doing something for all of the parents in the school. We had several meetings and discussions with the principal and teacher in which we tried to clarify these expectations. As the principal began to better comprehend the nature of the FAMILY MATH program, she saw the need to train other teachers. Several alternate ways of accomplishing this training were proposed, including holding a special two-day training workshop for all of the school's teachers. The principal also began to explore the possibility of a training workshop in the Fall for all the schools of that religious orientation.

Plans for the FAMILY MATH program were abandoned by school B for the rest of the 1990-91 school year in favor of concentrating on their "extensive testing program". The principal assured us, however, that it will be picked up again in the Fall since parents were very enthusiastic. Parents tell her that they are doing Family Math at home and are "having fun with their children" and that it's a "great way to get children motivated about math." One specific change parents talk about to her is that now, when shopping with their children, they are much

"more likely to talk about prices, amounts, and quantities."

One of the important things we learned from the experience with school B is that Family Math should seek to work with teachers with at least two to four year's prior classroom experience and, hopefully, with some prior involvement in special projects. Also critical is the need to stress the desirability of limiting the target group to parents-children in one or two grades, and designing the program so that the same group of parents and children have repetitive Family Math experiences. Although these points are made several times during the training workshop, they apparently still need reiteration.

School C presented another type of surprise, albeit a very positive one. Here, we had accepted the vice principal into the training workshop despite her having prepared us for the very real possibility that school C would not have a Family Math program "because the school is located in a very bad neighborhood and it would be impossible to get parents [many of whom live far away] to come here at night!"

Nevertheless, her excitement about the Family Math training she received (during which she first learned to use a pocket calculator's memory functions) led her to try to organize a program for parents and children in the afternoons, from 2:30-4:00 p.m., after classes. Working with the school's two grade 3 classes, her early assessments indicated that 16 parents might be interested in attending. She, therefore, planned six weekly meetings, starting with a January 31 session (three weeks after the training workshop). Families were charged a $5.00 fee to attend all six sessions to be used to cover refreshments and materials and supplies over the $50 the grant provided (to each school).

Six sessions were held in the Spring, spread over a longer period than initially anticipated due to the vice principal's personal problems and conflicts with other professional activities. Twelve parents signed up, but only five families and their third grade children regularly came to

meetings. (Note that four of the five children were girls.)[4]

The sessions were well planned in advance with detailed agendas (see Appendix H for sample agendas), including activities and handouts. A schedule was included with timed breaks and time set aside for evaluation. The meetings all took place in the teachers' room in the school, set up with five large, round tables and chairs each seating one parent-child group. The session's materials were laid out at the beginning and there were enough copies of charts, graphs, etc. for people to take the extras home.

Both mothers and children seemed to enjoy the activities. One woman felt that just after three sessions she felt better able to help her kids [all of her children] with math: "I can understand what they're learning in class when they bring home homework." One other mother said that her daughter was a "reader but was not good in math. [Now] it's good to see her smiling and having fun." A third person, the child's aunt, said "I thought it would only help her, but it helped me, too." All of the children "liked the games" and each one was able to tell us about "favorites".

Because of the small number of participants in the program at school C, it became readily apparent that Family Math training might profitably emphasize parent-child interactions. Without introducing sophisticated counseling techniques, Family Math presents very real possibilities to reshape and/or to reinforce how children and adults (parents) relate. But even leaders as skilled as school C's vice principal need to be directed to attend to this. It is all too easy to let the young people defer to their parents or, alternatively, to let parents dominate the interaction. At school C, these interactions were more obvious as a result of the small size of the group and the seating arrangements which did not allow a parent-child team to work with another or several other parent-child teams.

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[4]To appreciate the sacrifices parents make to attend, one mother who went to work two hours earlier in the mornings on Family Math days so that she could be at school by 2:30.

Family Math activities--indeed, the entire Family Math ambiance--permit new ways for parents and children to work and play together. It is an appropriate setting for insuring collaborative activity in which neither parent nor child has a systematic, consistent advantage. As such, it is a good vehicle for a neutral, cooperative coming together to solve problems.

School D ran its Family Math program for fifth, sixth, and seventh graders and their parents. Although it was "difficult to arrange the calendar", the sessions were scheduled from 7:00-8:30 p.m. on Monday evenings, starting March 4 and running through the end of April. More than 16 families attended the first session, with some sessions attracting as few as 11 families. Generally, however, all 16 families attended and there were always more children than mothers (9-14) or fathers (2) because some parents brought younger siblings and even younger, pre-school children.

The meetings were led by a teacher who was assisted by two parents, all of whom attended our two-day training workshop. They worked well together, understanding their mutual responsibilities and coordinating them smoothly. Two to four activities were covered at each meeting, in addition to the openers scattered around the room. The sessions started and ended on time.

Described by the CASE parent involvement specialist as "a very successful program", school D's parents and children reacted extremely positively. Their comments were especially interesting in light of the fact that, overall, there are fewer Family Math programs operating in the upper elementary grades. Occasionally, a student found an exercise "too easy for me" or "too hard for her--my mother gets many problems wrong". The observers' noted that the seventh graders were often very enthusiastic about the program, because they tend to spend even less time with parents than do younger children. One seventh grader said that "it's good for parents to be with their children". The success of FAMILY MATH with these upper grade children and their parents is particularly interesting in light of the popular belief that this is a more difficult group to work with and an age level that would "be reluctant to be seen with their parents".

School D ran an exemplary FAMILY MATH/NPS program in part because of the support given to the teacher by the trained parents. Unfortunately, however, the amount of preparation and effort they put into it--largely responsible for its outstanding success--also resulted in the leaders' feeling that the program was difficult to execute. This may have been reinforced by the fact that this is the principal's first year and, as such, there may have been added pressure "to do well". This notwithstanding, the Family Math Teacher training should not play down the effort required, but, in fact, should focus on shortcuts--especially alternative ways of making and/or assembling materials. The techniques developed by school G are noteworthy in this regard (see below).

School E also conducted an outstanding FAMILY MATH/NPS program that was a model of organization and efficiency. Like school D (and C), very soon after the training workshop, Family Math was "off and running". Their 5-session program, scheduled for Thursday evenings from 7:00 to 8:30 p.m., began on February 21 and met weekly through the end of March.

The two people from school E who were trained in Family Math, the principal and the math teacher, jointly conducted the workshops for students from grades 4 and 5 and their parents. Ten families signed up for the program which met in the school library. A $5.00 per family fee was charged to help offset the costs of materials and refreshments.

The 10 mothers attended regularly. Frequently, two or three also brought a younger child to the meeting. Families came early to work on the openers. From three to four Family Math activities were presented each evening, with the co-leaders alternating. Parents and children worked in teams and a great deal of attention was paid to having larger groups of parents and children work together. Using a room that had tables that seated six to eight people facilitated this kind of interaction.

The sessions were very lively and even though they could have benefitted from more focus on the mathematics underlying the various activities, participants reacted positively and enthusiastically. The high level of interest parents and children demonstrated at the last session

typified their involvement. One parent explained that, "at first, my son didn't want to come. Now he's sorry it's ending." And from the little boy, a wish--"could we have this in the summer?" Participating children brought some of the exercises to school with them and were observed in the cafeteria sharing them with other children.

As indicated, school E's program was very well organized and carefully planned. Activities were selected to give parents and children exposure to such math topics as arithmetic, geometry, probability and statistics, measurement, estimation, and math and career information. When necessary, notices to parents were in two languages and we were also able to supply school E, and the other Greek American schools, with a draft translation into Greek of the Family Math book.

Because of the smooth coordination of the program, it was easy to observe some typical parent-child interactions. For example, it was not uncommon for the mothers to note that, "see, you learned something." The children, however, are very impatient with mothers who "didn't get it" fast and one child insisted his mother didn't really win. One little girl whispers the correct spelling of "beans" in her mother's ear. Both parents and children told project staff that it was being with "my mother" (or "my child") and doing these activities that made Family Math "special".

The way the program operated in school E, and in other sites as well, highlighted aspects of Family Math that deserves additional attention. In particular, future training workshops might profitably focus on (1) the mathematics that are involved in the activities, and, as noted (2) on parent-child interactions. Leaders should be reminded that, in addition to making sure that parents and children experience the activities as fun, it is also important to reinforce their understanding that each activity calls for at least one--and often times, several different math skills, operations, and/or principles. Both parents and children need to learn that it is as much the math as it is other things that makes an activity enjoyable and challenging.

Attempting to deal with the interactions between parents and children does not necessarily

require high level small-group techniques, but it does call for sensitivity and some awareness of the maladaptive ways parents and children react. Family Math Teachers need to discuss various good strategies for ensuring that parents and their children work together, that both have opportunities to compete and to cooperate, and that--to the extent possible--activities are selected so as not to give parents a consistent "edge".

School F devised an entirely different approach to Family Math. Although here the principal and only one teacher (the school's math teacher) attended the training workshop, by the end of the year, six other teachers had been involved and FAMILY MATH sessions were held for parents and children of grades 2, 3, 4, 5, 6, and 7. The principal and teacher were responsible for the training of the other teachers and, based on staff observations and participants' feedback, there were no differences when their Family Math skills were compared with the skills of teachers trained in the more usual, traditional way.

The first FAMILY MATH/NPS session at school F took place during the day on February 1. Eighteen parents of grade 5 and 6 youngsters attended the meeting which was led by the teacher we trained. The second session for the fifth and sixth grades (now divided into two separate groups) was held in the early evening of March 8, at which time the first session for third grade children and parents was also scheduled. The third and the fifth grade groups were directed by the school's grade 3 and grade 5 teachers, respectively, under the tutelage of the principal and the Family Math Teacher. We observed these sessions that included six parents and five third graders, (five mothers and one father); three fathers and two mothers with their five grade 5 youngsters and one younger sibling; and six mothers and eight children in grade 6 (two of the children were in other grades but came to this session to translate the materials into Chinese and Korean for their parents).

At the April FAMILY MATH session, a second grade group of parents and children was added, and sessions were also held for grade 6 (meeting #3), grade 5 (meeting #3), and grade 3 (meeting #2). The seventh grade group was also formed and met for the first time. Attendance picked up in April, with as many as 12 parents attending some of the groups. The May meeting

incorporated grade 4, led by the newly trained fourth grade teacher, as well as grades 2, 3, 5, 6, and 7. The two final FAMILY MATH sessions, which took place at the end of May and at the beginning of June, saw the program operative throughout the school. By the end of the project, FAMILY MATH/NPS had permeated school F and parents, teachers, and children responded with great interest and enthusiasm. It also attracted an unusually large proportion of fathers and two-parent couples.

Visitors to the school on FAMILY MATH night would be greeted by the teachers and by the principal, first with signs of welcome outside the building and then with other posters, directions, and refreshments. The amount of preparation that was done, including the selection of activities for each grade level and the assembling of the materials, was clearly evident. So was the concern of the school staff who, by and large, did an excellent job of running the program. The only awkwardness was in the neglect of openers. Here, although these break-the-ice exercises were available in each room--each grade met separately in its regular classroom--the teachers rarely directed the participants to them. As a result, especially for the group(s) meeting for the first time, the parents and children sat around quietly waiting for the session to "officially" begin. Since these first minutes can be very profitably used to put participants at their ease and to immediately engage them in doing math, the importance of "openers" and how to stimulate their use should be emphasized in the training.

School F devised a highly creative plan to phase in the Family Math program school-wide. The within-school training of teachers on a one-to-one basis also seems to be a viable technique that needs to be considered as one option in program expansion. Here, too, the training should also focus on making explicit the math underlying the activities, on pacing the session (i.e., on planning the number of activities that will be introduced), and on the productive use of time before the session's start.

School G's FAMILY MATH program deserves the highest praise. As a staff observer noted, " . . .in my 30+ years of working with innovative educational programs, I have never seen any effort as well conceived, well organized, and well executed as FAMILY MATH at school G.

I wish we had it on tape!"

FAMILY MATH/NPS started at the end of January with a general evening orientation meeting. Approximately 50 parents (mostly mothers) attended, as did members of the school board, including the president, and church clerics. Following an introduction by the principal, school G staff and project staff showed the 18-minute promotional videotape, demonstrated several activities, and responded to questions from the audience. Although the parents were interested in the program, they were also concerned about some logistics--"If you have it for one grade, what about a family that has two or more children in different grades?"--and about the long-range impact--"Will Family Math help my children pass math tests? get into good schools?"

Eighteen parents and their grades 2, 3, and 4 children attended the first session and approximately the same number were still in attendance by session #3 which took place at the end of January. Three additional sessions were scheduled to end by March, for a total of six sessions. Sessions generally started at 6:30, although by 6:15 p.m. groups of parents and children were busily and happily engaged in the openers placed upon tables around the math classroom in which the program took place. Planned to end at 8:00 p.m., it was not unusual for some parents and children to linger until 8:20 p.m. or so. A refreshment break at midpoint was also built into the schedule. The room was set up with tables that usually sat two children, but that were occupied by two families for FAMILY MATH. In the case of several families, mothers and fathers came to alternate sessions.

The two leaders, both of whom were at the January 9 and 10 training workshop, led the sessions to which the principal also came and participated. The leaders, the school's math teacher and the first grade teacher, shared in the planning of the program, which was highly encouraged by the principal. Each session was written up and every effort was made to make the materials durable and reusable. Indeed, much ingenuity went into designing spinners and other materials which had to be made by hand, as well as into the pencil and paper handouts. Making the materials so that they would be durable acknowledgedly took a great amount of time, but, in the words of one leader, "now we have them to use again anytime we want. We don't have to start

from scratch." During a session, the two leaders took turns conducting the activities. It was done very smoothly and looked spontaneous.

A typical session started by having the leaders review the opening exercises. First, each was described; then parents and children were invited to talk about their solutions and, if they hadn't yet done so, to work on the activities during the break or at the end of the meeting. Next, the evening's major activities were introduced one-by-one. Before going onto the next activity, the leaders would explore the one under discussion in great detail, showing the participants different variations--ways to increase its difficulty as well as ways to make it easier. Interestingly, the leaders also took this opportunity to demonstrate to parents and children some variations that would transform an activity into a competitive game as well as other ways of making it a cooperative endeavor. This was a very unique and very creative addition to Family Math.

Throughout, the leaders were also alert to the mathematics that were being called into play. For example, in the "Coordinate Tic Tac Toe" activity (which involves a grid), not only did the leaders use an enlarged for demonstration grid, but they defined and explained "ordered pairs", "coordinates", "Cartesian plane", and "matrix", and directions (N, S, E, W and NE, NW, and so on). In fact, they made sure that all of the students (and parents) understood these terms, although, as they explained, the children "wouldn't be meeting these ideas again until the higher grades when they would recognize them and remember what they meant."

Both leaders also frequently talked about how parents and children should work together. For example, one of them suggested that first the parents may want to do the writing (note the answer or keep the score), but that the children should also have a turn at this. All of the handouts and duplicates of materials were distributed in two languages for use at home. Parents were given little hints about the various ways to do an activity with their spouse and other children. Their suggestions were solicited and they were encouraged to report back on their experiences.

The meetings were very lively. Children were really anxious to answer the questions (most all

of them about the mathematics of the activity), as were many of the parents who also raised their hands (sometimes wildly waving them, too). Everyone volunteered whenever a volunteer was sought and there was an openness and excitement that would be hard to match. The atmosphere was warm and positive, but very professional. The leaders were superb--dynamic, knowledgeable, skilled at questioning, excellent motivators. There were groans at the end of each session and loud moans at the end of the last session because "no one wanted it to end".

IMPACT OF FAMILY MATH/NPS

FAMILY MATH, as it operated in its first year in selected nonpublic schools, had positive outcomes for:

- participating teachers, children, and parents;
- children and teachers who did not directly take part in the program; and on
- schools and institutional relationships.

To begin with, a large number of nonpublic school professionals were exposed to the ideas of Family Math for the first time. As a result of the November Orientation, the first year of FAMILY MATH/NPS reached 39 principals, teachers, and parent leaders, representing 26 different schools. The project trained 21 people in a two-day workshop in January; following this, one school provided formal training to six other teachers. By the end of the pilot project year, there was a total of 27 certified FAMILY MATH Teachers.

Twenty-two of these trained teachers and administrators had actual experience in leading FAMILY MATH groups of parents and children. Of the estimated 130 parents who attended the schools' orientations, a minimum approximation is that 83 regularly attended FAMILY MATH sessions. A somewhat larger number of children, 97, representing grades 3 through 7, also took part in FAMILY MATH. However, a very large number of <u>other</u> children were also exposed to Family Math in the classroom. All but three of the 27 trained FAMILY MATH Teachers taught regular classes, with approximately 25 students per class, and all indicated that they used the Family Math approach as well as specific FAMILY MATH activities with these

675 children. Other children, those in the teachers' own families and in the families and classrooms of friends and colleagues, can also be counted.

In addition to numbers affected, other evidence from parents, teachers, and administrators, in the form of assessed reactions during and after the program, and from observation and expert opinion, suggest additional wide-ranging benefits. These, in turn, should lead to or reinforce good attitudes toward math on the part of children and parents, and support of mathematics on the part of the schools. Included in Appendix I is an evaluation report summarizing participants' ratings of FAMILY MATH/NPS from the point-of-view of program improvement. In the section above, we have also included information that can be the basis for modifying the training of Family Math Teachers. The major outcomes in terms of teachers, children, and parents are presented below.

Benefits of FAMILY MATH for Teachers

Teachers who were trained in Family Math found the training to be:

- "good" to "excellent" in terms of preparing them to lead sessions.
- The FAMILY MATH Teachers were anxious to put their training to use and several schools started programs immediately.

As they translated their training into practice, it became apparent that the FAMILY MATH Teachers were well prepared to:

- plan a program--select appropriate exercises, assemble supplies, create materials, organize activities; and
- mount a program--recruit parents, select target grades, and work with the school's administration on space, scheduling, and other format questions.

Additional or followup training after the two-day workshop might emphasize:

- how to put participants at ease--making optimal use of openers;
- how to make explicit the mathematics involved in the various activities; and

- how to facilitate parent-child and small group interaction.

Surprisingly, in most cases, the training proved adequate in terms of overcoming:

- teachers' discomfort with respect to working with adults (i.e., the parents);
- teachers' own dislike of mathematics; and
- their lack of confidence in their ability to plan a Family Math program.
- It also enabled participants to share their training with their colleagues in novel and productive ways.

Teachers also reported that the Family Math problem-solving and hands-on approach had:

- applicability to the classroom. They told us that not only was the general philosophy of the program appropriate for in-class use, but that, moreover, they adapted many of the specific activities to use with the children in their class.
- transferability to their colleagues. The trained teachers shared general strategies and particular exercises with other teachers in the school and with colleagues in other schools. In one instance, school F, teachers undertook formal training of other teachers with outstandingly good results.
- At one school, E, the principal incorporates Family Math activities into the staff development sessions she runs for the teachers.

In terms of its impact on them, respondents to the Teacher's Survey (Appendix G) told us that Family Math gave them "a chance to work more closely with parents and children . . .with very little stress." One teacher noted that she "was able to get to know them [the parents and the children] better." Another teacher described the benefits for herself as, "it was just pure enjoyment for me with no strings attached." All respondents said that "yes", they would try another cycle of Family Math in the future--mostly because this one was "so very successful".

Observation of how Family Math was carried out in the nonpublic schools suggests that:

- using pairs of teachers (or other persons) from the same school can provide extra mutual support as well as support for the program. Preferably, at least one member of the team should have approximately three year's of classroom teaching experience;

- enthusiastic teachers can be encouraged to and often find imaginative ways to implement the Family Math program; and that
- Family Math appears to work as well with bilingual parents even if the sessions are carried out in English only. Only in one case where the mother's English was virtually nonexistent was translation necessary and, here, it was performed by an older sibling who came to the meetings.

Benefits of Family Math for Parents

Parents' enthusiasm for Family Math is evidenced first and foremost by their continued attendance at the sessions and their reactions to the Survey (see Appendix G). In no case where the program was operative over several sessions, even over a course of two to four months, did attendance drop off significantly; in most schools, the number of families taking part remained approximately the same from the beginning to the end of the program.

In light of parents' interest in the program, it is not surprising that:

- many younger children were also brought to the sessions, frequently because they were "interested in what was going on with my mother/father and sister/brother."
- in many instances, both parents were directly involved in the program, either attending as a couple or alternating who came with the child and who stayed home with the rest of the family; and
- there were many cases where fathers came to the Family Math sessions--a fairly unusual occurrence in most traditional parent involvement programs--but, it should be noted, never together with a daughter.

In at least three schools, families were charged a fee--usually $5.00 for the program. This helped the schools with the cost of refreshments and materials and supplies. Schools might want to explore whether higher fees or developing other funding strategies might produce enough income to reimburse teachers for their time and effort (see below).

In terms of the benefits they perceived accruing to them and their children, parent respondents to the Survey indicated that:

- they often did Family Math activities with their spouses and with their children.

- they came to the Program because "my son wanted to"; "I believed it would improve my child's math skills"; "it would be good to participate in a learning experience together [since] it was important to my daughter for me to see how her school work progresses"; "my child needs a little help in math"; "we wanted to see how the FAMILY MATH program works . . . it sounds good"; and "we thought it would be a fun learning experience".

Most parents elaborated on the theme of helping their child in math. One mother said she came "to try to find a way in which I could help my daughter with her math." Another indicated that she/he wanted to "show my boy that math can be fun . . . that you can learn and have fun, too." As one parent expressed it, she came because "I thought I would be able to learn something and therefore help my daughter. "So I could help my child . . . When it came to math, she refused to let me help her", was another mother's explanation. Only three respondents talked about having fun--one said, "we came because we liked math and we wanted to do something"; and one indicated it was "to share some quality time together." Teachers thought the program was beneficial to parents mainly because it taught them "to play with their children."

In keeping with their expectations, parents described the "one best thing about FAMILY MATH" as being the fact that "we did it together." Several expressed liking the interaction with other parents and children--"working together and with the other families", "participating with other families", and "the different ways we were grouped for the activities[5]." One parent especially liked the interaction with the teachers and the fact that the teachers "worked so hard".

Other frequently mentioned "best" things about FAMILY MATH included having fun, as mentioned: "learning to work with numbers in a fun way", "learning . . . in a relaxed, fun-filled atmosphere", "learning and having fun at the same time", and "the games we played". "Learning more about math" was the best thing for several other respondents. As one person said, "We learned the different methods you can use to solve a problem, without difficulty."

When asked about the one thing they "didn't like about FAMILY MATH", most parents said,

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[5]Parent-child groupings, team v. team, individual exercises.

"none", "nothing", or "I liked everything". Two people wished for "more sessions, please" and "we want to cover more activities". Only one mother expressed reservations about the program:

> Although I totally enjoyed attending . . . and what we did in class . . . I'm not sure if the children will apply it in their studies. I would be reassured if I thought this [the Family Math approach] would be continued in the classroom, but this is where I feel the drawback lies . . .
>
> . . . on the other hand, "I felt that it was a very positive step for the school and it made me feel a sense of re-assurement (sic) that the school principal and teachers were interested enough to try to something new . . . I sincerely hope this program and others like it will become part of our school's curriculum.

All respondents indicated that they "learned a lot" and that their child also "learned a lot". Parents were vocal about expressing what was learned by them and their children. Some mentioned specific things: "my son learned his fractions . . . me too." (Fractions was indicated by several respondents who noted that they "had actually forgotten them.") Parents (and children also) singled out graphs, geometric patterns, shapes and numbers, Venn diagrams, how to estimate, how to find missing numbers, probability, multiplying by 9, and how to use a calculator. Several parents talked about parents and children learning to "work cooperatively", learning that "math can be fun", and learning "ways to help my child in math without stress." One mother felt that she and her daughter "learned to get along together" better. A few respondents also mentioned learning about "reasoning" and "about the different ways to solve a problem."

Almost every parent (9 of 10) indicated that they did Family Math activities "at home". They did them with the children who participated in the program and with their other children, their spouses, and friends and friends' children. One mother said that "my daughter and her father" did some activities together; another indicated that "all the family did some activities"; and another mother said that her husband did them and that "it was interesting to him."

Without exception, all parent participants said that they would "recommend FAMILY MATH to a friend". Their reasons were that: "it is nice to do things with your children and to

understand math", "it makes the children love math", "it's a good experience to share a learning process and new activities with your child", "you learn to work with the child a lot better at home", "it made math informal", "it gives parents the chance on neutral ground to also be a student and a teacher", and "it is a wonderful way to spend time with your children".

One mother said:

> At first I didn't know if it was going to work for me and my daughter, but we tried it and it helps a lot . . . I hope our school continues to have this program to help all the children . . ..

Another parent said:

> It was a very positive learning experience for my son. I had to drag him to the first session (and he was afraid he'd have homework!); but, at the last session, he was sorry it was over--he was having so much fun! He wanted it to continue all year.

"It's a beautiful program", as one woman said, and "I'd recommend it because I want other people to enjoy it."

Benefits to Children Participating in Family Math

Based on the reports of parents and teachers and on observations, there were many and varied benefits to students--those directly participating in the FAMILY MATH workshop sessions as well as to their siblings and to their friends and classmates. Many of these positive outcomes, from the parents' perspectives, were described in the preceding section. In this supplementary section we will highlight these opinions as well as the feedback we obtained from teachers and principals and from project staff who observed children in actual FAMILY MATH sessions.

Teachers indicated that the program let children "thoroughly enjoy themselves" and "get their hands dirty with math skills." They believed it was a "very worthwhile" experience for the children (as well as for the parents); that it could have been longer--"more sessions"; and that other children in other grades "should have a chance to participate".

In terms of the optimal target grade level, there was general agreement that children in grades 4-6 benefited, although both the higher and the lower grades were mentioned as well. Indeed, the one observer of a group that covered students in grades 5, 6, and 7 noted that, "The seventh graders were extremely enthusiastic, which seems to contradict the general parent involvement literature which suggests that as students grow older they are more reluctant to have their parents involved in their schooling."

When asked, children told project staff that "math can be fun" and the Family Math "helps me [with math]". In those instances where a career component was introduced, participating students, especially those in the higher grade levels, speculated a lot about different occupations and learned about new careers--about what a geologist does, for example, and about opportunities in engineering.

Students enjoyed having their parents at these sessions but almost always felt embarrassed by them. They were shy about how their parents looked, about how they spoke (or did not speak!), about how they sat, about receiving instructions from them, and about how they did on the activities. One child whispered, "my mother gets many problems wrong"; several wanted their parents to "let me do it by myself"; and a few asked parents to "please don't volunteer". On the other hand, the children were quick to challenge their parents when a new activity was introduced. They showed off to their mothers and fathers, and also gave them instructions.

Most school principals felt that "involvement with their parents on a social and an academic level"--"sharing ideas and working together"--was the best thing about FAMILY MATH in terms of the children. One principal mentioned that children's attitudes toward math became more positive. They received good feedback from children, many of whom enjoyed it and wanted to participate again, as well as from parents who wanted the program made available to their other children. Several principals noted that the other children in the school seemed eager to take part in the program.

Benefits to the Schools

Over and above the obvious advantages of instituting a program that makes math enjoyable to children and that develops in them positive attitudes and skills that relate to achievement, the FAMILY MATH/NPS program meant many other things to the schools as well.

Of special interest was the speed with which FAMILY MATH caught on. Several programs started within a month after the teachers were trained. Considering that a school first had to develop a plan that included, at minimum, a target group, a schedule, and an outline of activities--then recruit parents and plan the exercises and assemble and construct the necessary materials (including demonstration sets)--is a strong indication of the enthusiasm FAMILY MATH generated among teachers and the support it gathered from administrators. The schools taking part in this pilot project had little, if any, prior experience in implementing special programs introduced externally; it is an acknowledgment of the worth of FAMILY MATH and of the foresight of administrators that they embraced this program so wholeheartedly and implemented it with such skill and interest.

By the end of the project year, word about FAMILY MATH had spread throughout the schools. As noted, other children and other parents wanted to be involved. FAMILY MATH Teachers discussed the program with their colleagues, showed them the activities, and helped them try out some of the exercises in regular classrooms. The FAMILY MATH Teachers reported that they regularly used the activities in their classrooms and felt that they helped children appreciate math, learn about alternate approaches to problem-solving, and experience math in a hands-on manner.

Teachers also thought that Family Math is "great P.R." in terms of the school atmosphere. They said it was a way of making parents more of a part of the school community with their children. One parent also indicated that the program brought parents, children, and teachers closer together. Principals agreed that FAMILY MATH fostered good public relations and, moreover, that it encouraged parental involvement, and also met the needs of the many parents who have "math phobia". One principal indicated that it enhanced the school's overall math

program. They also noted that other teachers and some parents would be interested in being trained in Family Math.

Every principal discussed FAMILY MATH/NPS with other principals in their area and all administrators indicated that they would like to offer the programs to more grades and to have more sessions. As one said, only one thing may hold him back and that's being unable to "xerox" Mrs. ____, "an excellent and dedicated teacher and good group leader".

Because Family Math does bring parents into the schoolhouse and into the classroom, the administrators of these nonpublic elementary schools are willing to work on ways to overcome some of the obstacles to implementation. These include two major problems--reimbursing the FAMILY MATH Teacher and scheduling the sessions.

In part perhaps because the program was initiated in mid-year, in part also because the teachers volunteered to lead the groups, and in part because in some schools only one teacher had been trained, the scheduling of sessions was difficult. For children and teachers, there are many competing school activities--e.g., sports events, fairs--as well as competing outside activities. (One little boy, for example, didn't want to come on Monday evenings because it meant giving up a favorite T.V. program. This was "solved" by taping the program for him and letting him watch it at another time.) Parents are also busy during the week and, in two schools, FAMILY MATH was conducted on Friday nights. With greater lead time, and as FAMILY MATH Night is incorporated into the school scheduling, this problem should diminish.

Far more important is the problem of compensating FAMILY MATH Teachers for their extra time--time spent in planning the program and in making the materials (estimated as one to three hours per session) as well as the evenings spent in leading the sessions. Nonpublic, religiously-oriented schools do not have large budgets (if they have any) to reimburse teachers for conferences or for inservice training, or to pay for substitute teachers. Fees of $5.00 per family obviously cannot cover the effort the teachers make in behalf of this program. Higher fees at the discretion of the school are, of course, possible, but may not be feasible across the board.

Other supplementary funding strategies, including special "cake sale" fund-raising events, and/or contributions from local businesses may represent viable alternatives. The long-range future and expansion of FAMILY MATH in the nonpublic schools is dependent on overcoming this obstacle. The response to this initial demonstration and the interest that has been generating among nonpublic schools throughout New York City and the surrounding area in participating in future cycles of FAMILY MATH makes it even more urgent.

APPENDIX A

Description of Family Math program

Family Math

Family Math is a project of the EQUALS program in 1981 at the Lawrence Hall of Science, University of California, Berkeley. For many years, EQUALS has worked with educators to involve more minorities and females in math programs.

Family Math was developed as a program where parents and children could actively learn math together and have fun doing it. The focus is on logical thinking and problem-solving with hands-on activities using easily available materials such as beans, pennies, toothpicks, bottle caps, and coins. Emphasis is on families talking about the way to solve problems.

The major goals of Family Math are: to help parents help their children with math at home; to recognize the importance of math for providing options for their children's future; and to demystify math, to change the perception of math as only arithmetic and computation.

Families meet together for four to six weeks for approximately two hours a week in informal settings in schools, community centers, and churches. In addition, for teachers, parents, counselors, community members, and others who want to teach Family Math classes, two day leadership workshops are given at the Lawrence Hall of Science, University of California, Berkeley. Parents and teachers are encouraged to come together as teams for training. Currently, Family Math classes have been conducted in more than 27 states and in several countries.

The topics in the 319 page Family Math book (in English and Spanish) reinforce the school (K-8) curriculum. Parents are given an overview of the topics included at their child's grade level and an explanation of the related Family Math activities that can be done at home with inexpensive materials.

Topics in the Family Math book include word problems and logical thinking, probability and statistics, estimation, measurement, geometry and spatial thinking, patterns and numbers, charts, and careers. Each activity includes a rationale for doing the activity (Why), a description and directions for doing it (How), and additional suggestions on how to use the activity in different ways (More Ideas).

The Family Math book includes instructions for starting a Family Math class, including lesson plans and hands-on activities for parents and children. The Family Math book, a 17 minute videotape, and a film We All Count in Family Math, are available for sale or rental.

Appendix E is a list of materials available from Family Math.

For information: Virginia Thompson
Director of Family Math
Lawrence Hall of Science
University of California
Berkeley, CA 94720

In 1986, Family Math, Berkeley, was funded by the National Science Foundation to gear its program toward reaching more low-income minority families. Five community agencies that dealt with improving educational opportunities for minority youth were selected to carry out Family math programs in their communities. The five agencies were:

1. Valle del Sol, Phoenix, Arizona, an area with predominantly Hispanic population, with "high drop-out, illiteracy, and unemployment rates."

2. Indianapolis Urban League, a chapter of the National Urban League, providing health, education and employment counseling to a predominantly population.

3. Oregon Indian Education Association, Salem, Oregon, a coordinating body that supports Indian education programs.

4. Alba Society, San Diego, California, a group of Mexican-

American professionals concerned that too few Mexican-American students finish college. Alba offers scholarships to approximately 25 students yearly. Alba became interested in Family Math because most of the recipients of scholarships had strong family support.

5. National Urban Coalition, Washington, D.C., which has a strong educational base and has helped communities set up Family Learning Centers, focusing on math, science, and technology.

An evaluation commissioned by EQUALS, of the implementation of Family Math in these five community agencies, was completed in 1988 by Patrick M. Shields and Jane L. David. They conclude that "the National Science Foundation Family Math project allowed the agencies to reach the hardest-to-get segments of their audience . . . the poorest, the most remote, and those typically overlooked."

Some of the comments included in the evaluation report are:

> Its focus on mathematics and on families learning together present a very positive image to parents, to schools . . ."
>
> Family Math provided the agency with the tools to build a more constructive relationship with the schools, rooted in the common pursuit of better education for inner-city youth and parent involvement.
>
> Teachers and parents both come away from the workshops with different attitudes towards mathematics . . .what it is, how it is connected to everyday life, and what problem-solving means.
>
> Bringing together parents and school personnel in this fashion is an important first step in bringing the community and the school closer together.
>
> When Family Math classes succeed, they alter fundamental perceptions about learning in general, and math learning in particular.
>
> [And finally], the five community Family Math projects present scenes in sharp contrast to the stereotypes of the lives of poor and minority. Instead of crack-filled playgrounds, we are presented with a scene of two retired school teachers working with adolescents and their parents in a previously vacant building. Instead of TV

> images of destitute Indian families, we see tribal members leading classes of adults and children. In place of picture of illegal immigrants wading across the border, we see Hispanic parents leading other parents and their children in geometry games less than a mile from the Mexico border.

The Consortium for Educational Equity at Rutgers University has been conducting Family Math training courses, primarily for New Jersey teachers, for the past four years. The program is similar to Family Math in California (Rutgers' staff was trained at Berkeley), but requires a commitment from a school district or an individual principal to implement the program. Teachers are trained to lead Family Math classes, and are expected to return to their school to design programs and materials based on the training model. The Consortium for Educational Equity is located at Rutgers University Kilmer Campus, New Brunswick, New Jersey, 08903, Arlene Chasek, Director of the Family Math project.

Reports from Berkeley and Rutgers include quotes from participants that indicate that parents and children are enthusiastic about Family Math. Participants are less anxious and fearful about math. Many have developed more positive attitudes and confidence in doing math activities. Teachers, too, have incorporated Family Math activities into their classrooms, focusing more on problem-solving and less on drill.

Other community organizations that have incorporated Family Math into their programs are Girls Clubs of America's Operation SMART (a program to encourage every girl in Science, Math, And Relevant Technology) and the Linkages Project of the American Association for the Advancement of Science (AAAS). These organizations work toward improving math and science education for minorities and women. The AAAS Linkages Project defines resources of math and science to include "places, people, ideals and materials of math, science and technology." Operation SMART is concerned that females

drop out of math and science courses, thus limiting their opportunities for jobs in the future.

For Information: Girl's Clubs of America, Operation SMART
205 Lexington Avenue
New York, NY 10016

Linkages Project
Office of Opportunities in Science
American Association for the Advancement of Science
1333 H Street N.W.
Washington, D.C. 20005

There is increasing interest on the part of the New York City Board of Education, teachers, supervisors, and parents to implement Family Math in New York City. As a result of meetings with Virginia Thompson, the Director of Family Math, Board of Education staff from the Math Unit, and CASE staff, Family Math is being piloted in New York City.

For Information: Mathematics Unit
New York City Board of Education
131 Livingston Street
Brooklyn, NY 11201

APPENDIX B

Details of inservice credit, Catholic Diocese of Brooklyn

OFFICE OF CATHOLIC EDUCATION
DIOCESE OF BROOKLYN

Division of Planning and Public Policy

6025 Sixth Avenue
(718) 492-1800
Brooklyn, New York 11220-4098

September 28, 1990

TO: Elementary School Principals

FROM: May Santos, Director of Program Management

SUBJECT: FAMILY MATH OPPORTUNITY

Responding to the funding priorities established under TITLE IIA of the Dwight D. Eisenhower Higher Education Act the Center for Advanced Study in Education (CASE, of the Graduate School and University Center of the City University of New York) applied for, and received, a grant to provide inservice training programs for new and experienced elementary nonpublic school teachers. Using the "FAMILY MATH" program, a mathematics-based program, CASE proposes to train middle-grade elementary school teachers to work with parents and their children to improve children's math skills and parents' understanding of math concepts in support of children's learning.

FAMILY MATH, an exciting new program that brings parents and children together, is being offered to your school this year. The program currently operates in 30+ states and in several countries. This is the first time it is being offered to nonpublic schools in New York City.

An ORIENTATION MEETING for principals, math coordinators and teachers will be held on NOVEMBER 15, 1990 at the City University Graduate Center (42nd Street/6 Avenue) at 1:30 to 3:30 P.M. To reserve a place for you and/or a representative from your school (including parents) please call Barbara R. Heller or Ann Kelly at (212) 642-2910.

For your information workshops associated with the Program (not the Orientation Meeting) have been pre-approved for Professional Development credit by the Office of Catholic Education. In order to receive this credit participants should submit evidence of course completion to Sister Sheila Conley, together with the appropriate fee.

If you need additional information please do not hesitate to contact me.

asa

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APPENDIX C

FAMILY MATH Promotional Materials

The Graduate School and University Center
of the City University of New York

Center for Advanced Study in Education
Graduate Center 33 West 42 Street New York, N.Y. 10036

FAMILY MATH OPPORTUNITY

FAMILY MATH, an exciting new program that brings parents and children together sharing mathematics, is being offered to your school this year. Called the "most innovative, interesting project of the decade" by experienced educators, Family Math currently operates in 30+ states and in several countries. This is the first time Family Math is being made available to the nonpublic, religiously-oriented schools in New York City.

An **Orientation Meeting** for principals, math coordinators and supervisors, and teachers will be held on **November 15, 1990** at the City University Graduate Center in mid-Manhattan from 1:30-3:30 p.m. Family Math specialists will talk about the kinds of activities parents and children do; the dramatic benefits for children, parents, teachers, and schools; and how your school may take part in this special opportunity.

To reserve a place for you and/or a representative from your school (including parent leaders), call Barbara R. Heller or Ann Kelly at 212/642-2910.

pr

C1

What is FAMILY MATH?
It's parents and kids doing and learning math together
It's NOT a teacher standing in front and LECTURING!
It's doing activities and playing games
It's using beans and buttons and pennies to solve math problems
It's organizing information in new ways
It's working and talking with others
It's sorting things and learning about logic.
It's finding out that calculators can free our minds for solving harder problems
It's exploring shapes and geometry
It's estimating and developing number sense
It's finding that math is a TREASURE we all can share!

WHAT IS FAMILY MATH?

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SE TRATA DE QUE LOS PADRES E HIJOS SELECCIONEN Y RESUELVAN MATEMÁTICAS JUNTOS
SE TRATA DE HACER ACTIVIDADES Y REALIZAR JUEGOS.
SE TRATA DE USAR FRIJOLES, BOTONES, Y CENTAVOS A FIN DE RESOLVER PROBLEMAS DE MATEMÁTICAS.
SE TRATA DE NUEVAS FORMAS DE ORGANIZAR INFORMACIÓN
SE TRATA DE HABLAR Y TRABAJAR CON OTROS.
SE TRATA DE CLASIFICAR Y ORDENAR PARA APRENDER LA LÓGICA.
SE TRATA DE DESCUBRIR COMO LA CALCULADORA DEJA VOLAR NUESTRAS MENTES Y RESOLVER PROBLEMAS MÁS DIFÍCILES.
SE TRATA DE EXPLORAR FORMAS Y GEOMETRIA.
SE TRATA DE ESTIMAR Y DESARROLLAR EL SENTIDO DE LOS NÚMEROS.
SE TRATA DE ENCONTRAR QUE LAS MATEMÁTICAS SON UN TESORO QUE TODOS PODEMOS COMPARTIR!

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FAMILY MATH, Lawrence Hall of Science, University of California, Berkeley, CA 94720
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APPENDIX D

Brochure Describing FAMILY MATH in the Nonpublic Schools

FAMILY MATH:
A National Program

FAMILY MATH brings parents and children together to share mathematics.

Led by a trained teacher, administrator, interested parent, or other adult, FAMILY MATH sessions include small groups of parents and children. Sessions usually last two hours for 6-8 weeks and may be given in the afternoons or evenings at the convenience of the local school. Parents and children engage in interesting activities that reinforce basic mathematical concepts and skills.

Materials for FAMILY MATH

- are based on the school mathematics curriculum.
- are provided for use at home to create a family enjoyment of mathematics.
- emphasize a problem-solving approach.
- improve students' interest and motivation in math; and result in higher achievement.
- bring parents into the schools.
- stimulate teachers' ideas.

FAMILY MATH, developed at the University of California at Berkeley, is being used by schools in 30+ states and several foreign countries. Introduced to the New York City Public Schools in 1988, this is the first funded FAMILY MATH program available to the nonpublic schools.

FAMILY MATH: ORIENTATION
NOVEMBER 15, 1990

TRAINING OPPORTUNITY
January 9 and 10, 1991

On Thursday, November 15, 1990, CASE (the Center for Advanced Study in Education) is hosting an Orientation to FAMILY MATH for the nonpublic, religiously-oriented schools in New York City.

The opportunity to be part of this nationally-acclaimed program is available:

- to selected nonpublic schools, including those affiliated with Agudath Israel of America, the Board of Jewish Education of Greater New York, the Catholic Archdiocese of New York, the Catholic Diocese of Brooklyn, the Greek Orthodox Archdiocese, and others.

CASE will provide schools participating in this first demonstration with:

- teacher training, assistance with program implementation, and a small stipend to cover the costs of books and some materials.

Principals and other administrators, including math coordinators and curriculum specialists, as well as interested teachers and parent leaders are encouraged to attend the FAMILY MATH ORIENTATION:

- Thursday, November 15, 1990
- 1:30 - 3:30 p.m.
- The City University Graduate School and University Center
  33 West 42 Street (opposite The New York Public Library)
  New York, NY 10036
- Room 1700 B/C

RESERVE A PLACE EARLY FOR YOU AND YOUR STAFF.

The ORIENTATION will describe the FAMILY MATH Program; discuss how the program operates in New York City and elsewhere; and review the benefits for students, parents, teachers, and school organizations. There will be a question-and-answer period. Representatives from the systems of nonpublic, religiously-oriented schools will also be available.

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Use this coupon to reserve a place at the afternoon ORIENTATION meeting; or call Barbara R. Heller or Ann Kelly at 212/642-2910.

Name: _____
Title: _____

School Name: _____
School Address: _____
_____
School Phone: (___) _____

Also hold a place for:

Name: _____
Title: _____

Name: _____
Title: _____

- o I would like more information about:
  - o FAMILY MATH
  - o The NYC Program
  - o other; specify: _____

- o We are interested in taking part in FAMILY MATH and will probably attend the January 9 and 10, 1991 TRAINING conducted by Virginia C. Thompson and project staff.

FAMILY MATH
for Nonpublic, Religiously-Oriented Schools in New York City

Barbara R. Heller, *Director*
Marjorie R. Hendler, *Consultant*
Virginia C. Thompson, *Founder and Director of FAMILY MATH*

Center for Advanced Study in Education
Graduate School and University Center of the City University of New York

25 West 43 Street
New York, NY 10036

212/642-2910

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APPENDIX E

NPS Orientation Meeting Materials and Rating Forms

Dial-A-Teacher E1
Selected Research Findings from the Johns Hopkins University Study of Teacher Practices of Parent Involvement . . E2
Parents as Partners E4
Family Math Sampler E5
Data Feedback Form E12

Figure 2
N= 54,626

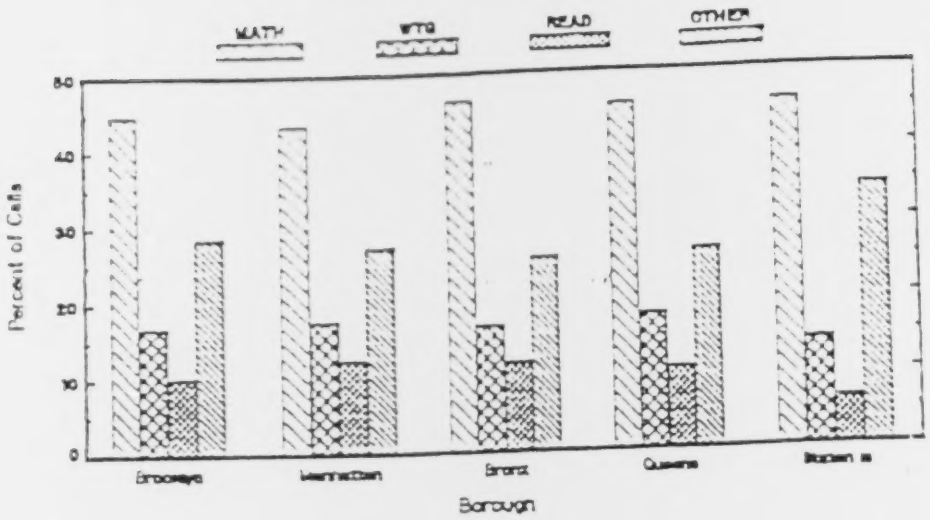

Table 3 shows the percent of calls, by grade level and subject area, received by Dial-A-Teacher. Details for sub-skills may be found in Appendices D and E.

TABLE 3
Dial-A-Teacher
Subject Category of Calls for Each Grade
Percent of Calls By Grade
N = 55,699

Grade	Reading	Math	Writing	Other Subjects	Info	Other
10-12						
Total	10.8%	45.2%	16.8%	19.5%	1.5%	6.1%

From: United Federation of Teachers/Dial-A-Teacher Final Evaluation Report, December 1988.

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FAMILY MATH/Nonpublic Schools
ORIENTATION MEETING, November 15, 1990

Selected Research Findings from the Johns Hopkins University Study of Teacher Practices of Parent Involvement*

The following selected research findings formed the basis for the development of the TIPS Math program--a program in which teachers develop homework assignments that involve children in practicing math skills and parents in providing feedback to children and their teachers.

A survey of TEACHERS found that:

- Most teachers involve parents in reading or reading-related activities when they request parents to help their children at home. About two-thirds of the teachers frequently ask parents to conduct reading activities with their child at home, and about 20% say this is their most satisfying parent involvement practice.
- Teachers who actively and frequently use parent involvement include parents with all educational backgrounds, not only well-educated parents.
- Teachers who use parent involvement activities show more appreciation of parents and report more cooperation from parents than do other teachers.
- Teachers who frequently involve parents rate them higher in helpfulness and follow-through on learning activities than do other teachers. Teachers who are leaders in the use of parent involvement rate single parents and less educated parents as helpful and effective as other parents.
- Teachers who do not include parents in their teaching practice, rate single parents and less-educated parents as less helpful and less responsible than married and better-educated parents.
- Teachers overwhelmingly believe that schools cannot solve problems without parents' help.

*taken from Table 1 from The Tips Process Teacher's Manual, by Joyce L. Epstein, November 1987, School and Family Project, Center for Research on Elementary and Middle Schools, The Johns Hopkins University, Baltimore, MD 21218.

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A Survey of PRINCIPALS found that:

- Principals overwhelmingly believe that parent involvement is important for the success of schools and students.
- Principals' roles varied from actively encouraging, to passively permitting, to actively preventing teachers' use of parent involvement in home learning activities.

PARENTS reported that:

- Parents were generally positive about their children's elementary schools, but over 90% wanted teachers to take responsibility to tell them how to help their children at home.
- Working mothers and single parents volunteer less often to work at school, but help their children at home on school work as much or more than mothers who work at home or married parents.
- Parents who are frequently involved in learning activities at home report that they know more about their child's instructional program, believe the teacher wants them to help at home, get more ideas from teachers about how to help at home.
- Parents view teachers' use of parent involvement techniques as a teaching strength. They give teachers who are leaders in the use of parent involvement higher ratings in interpersonal skills and overall teaching ability.

Parents as Partners

SHIRLEY FRYE
NCTM President

OUR GOAL of providing the opportunity for all students to acquire mathematical power requires that they have a positive attitude toward the learning of mathematics. Parents, who are also their daily teachers, can enhance this attitude. As mathematics educators, we rely on parents to be our partners in achieving our common goals of success for all students in mathematics.

To assist parents in assuming their important role, NCTM provides these pamphlets as a resource of ideas:

"Help Your Child Learn Math"

"Using Calculators to Improve Your Child's Math Skills"

"Elementary School Mathematics: What Parents Should Know about Estimation"

"Elementary School Mathematics: What Parents Should Know about Problem Solving"

"Family Math Awareness Activities"

The first two are now available in Spanish and French. Please inform your students' parents of these useful pamphlets and encourage their involvement.

The PTA, with a grant from the Exxon Foundation, developed and distributed 32 000 copies of the kit *Math Matters—Kids Are Counting on You* to elementary schools throughout the country.The kit contains (1) a videotape that focuses on parental attitudes toward mathematics and how parents can influence their children, (2) a calculator with specific family applications, and (3) a set of home activities. The National Council of Supervisors of Mathematics has sent a kit to each of its members to use with parents and principals in their own districts. Make certain that this important resource is available in your district.

A joint committee composed of Henry Alder from the MAA, Ann Kahn from the PTA, and Kay Gilliland from NCTM prepared a paper, "Parent Involvement—Essential for Success in Mathematics," to enlist parental support and encouragement for the learning of mathematics. This powerful message communicates how vital educators believe parents are in the mathematics education of children.

Please share this statement with parents in your school and community and express our gratitude to them. Involve them in the challenging task of convincing all students that mathematics is vital for their future as productive citizens. With parents as our partners, the goals described in the *Curriculum and Evaluation Standards* are achievable.

Parent Involvement—Essential for Success in Mathematics

Parental support and encouragement are vital to children's mathematical development and success in school. What parents do with their children is more important than who the parents are socially, economically, and educationally.

Parents are their children's first and most influential teachers. Many schools are devising programs to help parents provide additional support in mathematics to their children. These programs are not dependent on the parents' background in mathematics but do involve parents in the process of developing within their children an understanding of the need for mathematics in order that future career opportunities not be foreclosed.

All children must have an education that will enable them to function effectively in a world where mathematics is necessary for an ever-increasing number of career options. Job opportunities and the responsibilities of citizenship will require the ability to solve problems, to develop mathematical models, and to apply specific skills to real situations. Therefore, parents must make clear to their children the relevance and importance of mathematics to personal life and participation in society.

Parents must take an active role in their children's education by—

- discussing regularly with their children their classroom activities and listening carefully to their explanations of what they have learned;
- providing time and a place for doing homework assignments;
- encouraging their children to persist when the work becomes difficult but not to expect parents or tutors to do the work for them;
- participating in parent-teacher conferences;
- taking advantage of opportunities to visit mathematics classes;
- engaging with their children in appropriate family games, puzzles, and other activities that use a variety of mathematics skills.

Parents can complement the efforts of the school by becoming aware of—

- the breadth of topics that are in mathematics programs from kindergarten to grade 12—mathematics is more than computation;
- the importance of manipulatives in all grades as aids in illustrating and developing mathematical concepts and enabling students to gain insight into problems;
- the use of technology, from calculators to computers, as tools for extending the student's mathematical power;
- the emphasis on the process of working toward a solution rather than just getting the right answer, since the process is a lifetime skill;
- the ways in which problem solving is learned in school and at home;
- the purpose of assigned homework;
- the school's expectations of students;
- the evaluation methods used by the school and the interpretation of the student's test results;
- the fact that the use of the textbook is only one of the instructional strategies used to teach mathematics.

Active efforts to promote the interaction of families and schools are essential to realize the full potential of every child. A cooperative effort among parent-teacher organizations, community groups, and school districts will help parents assure their children's enjoyment of, and success in, mathematics.

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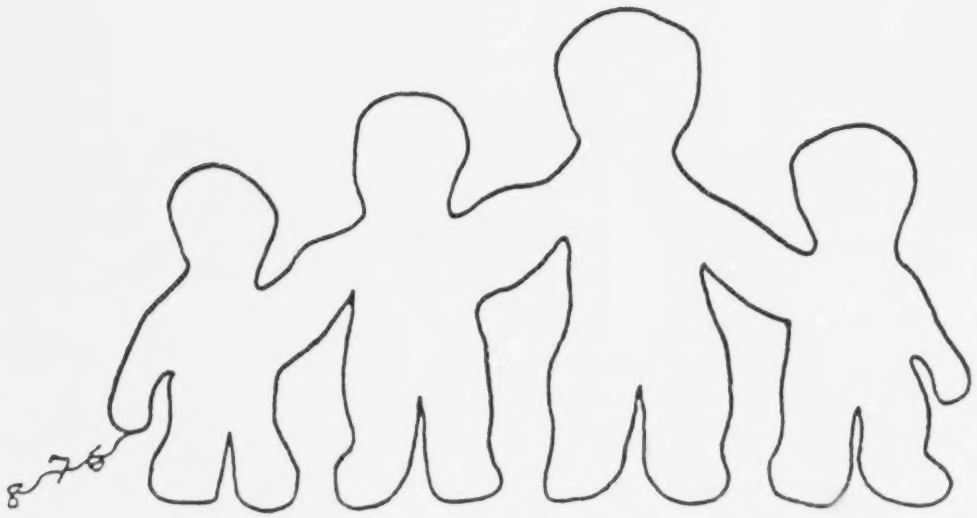
FAMILY MATH SAMPLER



From the EQUALS Program, Lawrence Hall of Science,
University of California, Berkeley, California 94720

[1990-91 NYSED # 310200 81 3020 Nonpublic Schools/NYC]

FAMILY MATH Sampler

"How can I help my child with math at home?"
"What role will math play in my child's future schooling and work?"
"Is it possible to enjoy math?"

Thousands of parents are discovering the answers to these questions. The FAMILY MATH program, part of the EQUALS project, based at the Lawrence Hall of Science, University of California, Berkeley, is teaching them how to help their children learn mathematics. Many parents would like to help their children, but they don't know how to begin.

A FAMILY MATH course, taught by a teacher, parent, or community worker in a school, church, or home, gives parents together with their children opportunities to learn activities that reinforce and supplement the school mathematics curriculum. Classes provide a setting for families to enjoy doing mathematics together. In addition, families meet women and men from the community who are working in math-based occupations and learn about the role of mathematics in future education and jobs.

Classes are usually taught by grade levels (K-1, 2-3, 4-6, 7-9, and so on), although variations do occur. The course may last for four to eight weeks, with once-a-week classes that last an hour or two, usually in the evening. They meet in schools, churches, and homes.

Many activities may be used in a FAMILY MATH class. You will find sample activities from the *FAMILY MATH* book in the back of this pamphlet. Some special qualities help families to learn math together. In our activities, we look for:

- *development of problem-solving skills*
  By problem-solving skills, we mean ways in which people think about how to solve a problem. Students and parents learn to look for patterns, draw pictures and diagrams, work backward, guess at the answer and then check, and apply a host of other strategies when solving problems.

- *an emphasis on working together*
  Talking about the activities not only opens the door for parents to help their children (and for children to help their parents), but adds a new dimension to the learning. Using the language of mathematics helps to clarify and firmly establish the understanding of concepts.

- *an active "hands-on" approach, using inexpensive materials*
  By "hands-on," we mean using concrete objects such as blocks, beans, pennies, toothpicks, and the like to help children understand the meaning of numbers and spatial concepts.

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- *activities from all of the topics of mathematics*
  We include geometry, measurement, probability, statistics, estimation, logical thinking, how to use a calculator, as well as numbers and arithmetic. In today's technological age, we do not want our children to be short-changed by spending time only on arithmetic drill and practice

- *an emphasis on the importance of mathematics to future learning and work*

FAMILY MATH might well be called a daughter of the EQUALS project, which is based at the Lawrence Hall of Science. For the last ten years, EQUALS has presented inservice workshops for K-12 teachers addressing the issue: How can we encourage **all** students to continue with mathematics when it becomes optional? In particular, how can we reach and encourage those students who have been, traditionally, the first to drop out--our Black, Hispanic, and Native American students, and females of all races? Our EQUALS teachers asked for materials to carry information about the importance of mathematics education for today's children to their parents.

In 1981, we received three years' funding from the Fund for the Improvement for Postsecondary Education to develop the curriculum and teach pilot FAMILY MATH classes in Richmond and Oakland, California. Follow-up questionnaires indicated that FAMILY MATH parents had done math activities at home with their children, helped with math homework, talked to their children's teachers about mathematics, talked to their children about jobs and careers, and acquired math puzzles and books for their children. Parents also took actions for themselves, including buying a math book or taking a math class.

In 1983, we began to present a two-day inservice workshop for those people who wanted to establish and teach FAMILY MATH courses in their own communities and schools. Since that time, the program has spread throughout California and to nine other states and Australia. As of April 1986, the inservice program has reached over 2300 parents, teachers, and community members, who have in turn taught more than 600 FAMILY MATH courses to over 7500 families or more than 15,000 parents and their children. The FAMILY MATH curriculum has been published in the *FAMILY MATH* book; a film, "*We All Count in FAMILY MATH,*" has been made to document the program. *Matemática para la Familia*, a Spanish translation of the book, is also available.

FAMILY MATH inservice workshops are now given at several sites around the country and Australia, as well as at the Lawrence Hall of Science in Berkeley. For further information about the program, write to:

FAMILY MATH
Lawrence Hall of Science
University of California
Berkeley, California 94720

* *activities from all of the topics of mathematics*
  We include geometry, measurement, probability, statistics, estimation, logical thinking, how to use a calculator, as well as numbers and arithmetic. In today's technological age, we do not want our children to be short-changed by spending time only on arithmetic drill and practice.

* *an emphasis on the importance of mathematics to future learning and work*

FAMILY MATH might well be called a daughter of the EQUALS project, which is based at the Lawrence Hall of Science. For the last ten years, EQUALS has presented inservice workshops for K-12 teachers addressing the issue: How can we encourage **all** students to continue with mathematics when it becomes optional? In particular, how can we reach and encourage those students who have been, traditionally, the first to drop out--our Black, Hispanic, and Native American students, and females of all races? Our EQUALS teachers asked for materials to carry information about the importance of mathematics education for today's children to their parents.

In 1981, we received three years' funding from the Fund for the Improvement for Postsecondary Education to develop the curriculum and teach pilot FAMILY MATH classes in Richmond and Oakland, California. Follow-up questionnaires indicated that FAMILY MATH parents had done math activities at home with their children, helped with math homework, talked to their children's teachers about mathematics, talked to their children about jobs and careers, and acquired math puzzles and books for their children. Parents also took actions for themselves, including buying a math book or taking a math class.

In 1983, we began to present a two-day inservice workshop for those people who wanted to establish and teach FAMILY MATH courses in their own communities and schools. Since that time, the program has spread throughout California and to nine other states and Australia. As of April 1986, the inservice program has reached over 2300 parents, teachers, and community members, who have in turn taught more than 600 FAMILY MATH courses to over 7500 families or more than 15,000 parents and their children. The FAMILY MATH curriculum has been published in the *FAMILY MATH* book; a film, "*We All Count in FAMILY MATH,*" has been made to document the program. *Matemática para la Familia*, a Spanish translation of the book, is also available.

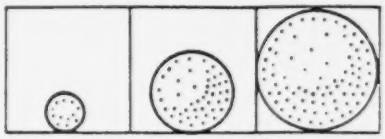
FAMILY MATH inservice workshops are now given at several sites around the country and Australia, as well as at the Lawrence Hall of Science in Berkeley. For further information about the program, write to:

FAMILY MATH
Lawrence Hall of Science
University of California
Berkeley, California 94720

Value of Words

Why

To practice mental arithmetic and estimation while problem-solving



Grade Level

TOOLS

Pencil
Paper

How

- ☐ Assign values to the letters of the alphabet, as shown:
- ☐ Have each person in your family find the value of his or her first name.
- ☐ Add up the numbers without using paper and pencil if you can.
- ☐ What is the most expensive word each of you can find?
- ☐ Can you find a word worth exactly $50? $100?

A = $ 1	N = $14
B = $ 2	O = $15
C = $ 3	P = $16
D = $ 4	Q = $17
E = $ 5	R = $18
F = $ 6	S = $19
G = $ 7	T = $20
H = $ 8	U = $21
I = $ 9	V = $22
J = $10	W = $23
K = $11	X = $24
L = $12	Y = $25
M = $13	Z = $26

More Ideas

- ☐ You and your child may want to make up different activities, such as:
  - ☐ Hold a week's contest to find the most expensive word.
  - ☐ Use penny values instead of dollars.
  - ☐ Find the difference between your first and last names.
  - ☐ Multiply the values instead of adding them.
  - ☐ Use fractional values, so that A = 1/26, B = 2/26, etc.

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El Valor de las Palabras

Porqué

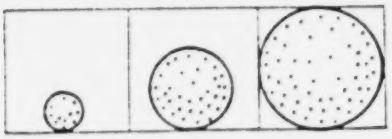
Para practicar la aplicación de la aritmética mental y la estimación a la resolución de problemas.

Cómo

- Asigna valores a las letras del alfabeto de la forma en que se indica más adelante.
- Pregunta a cada miembro de la familia por el valor de su nombre.
- Si puedes, suma los números mentalmente sin usar papel ni lápiz.
- ¿Cuál es la palabra más cara que cada quien puede encontrar?
- ¿Puedes encontrar alguna palabra que valga $50?, ¿$100?

Ideas Adicionales

- Otras actividades posibles a realizar con su niño:
  - Celebra un concurso de una semana de duración para ver quien encuentra la palabra más cara.
  - Utiliza centavos en lugar de dólares para asignarle valores a las letras.
  - Determina la diferencia entre los valores de tu nombre y tu apellido.
  - Multiplica los valores en lugar de sumarlos.
  - Utiliza fracciones para asignarle los valores a las letras. Por ejemplo, A=1/26, B=2/26, etc.



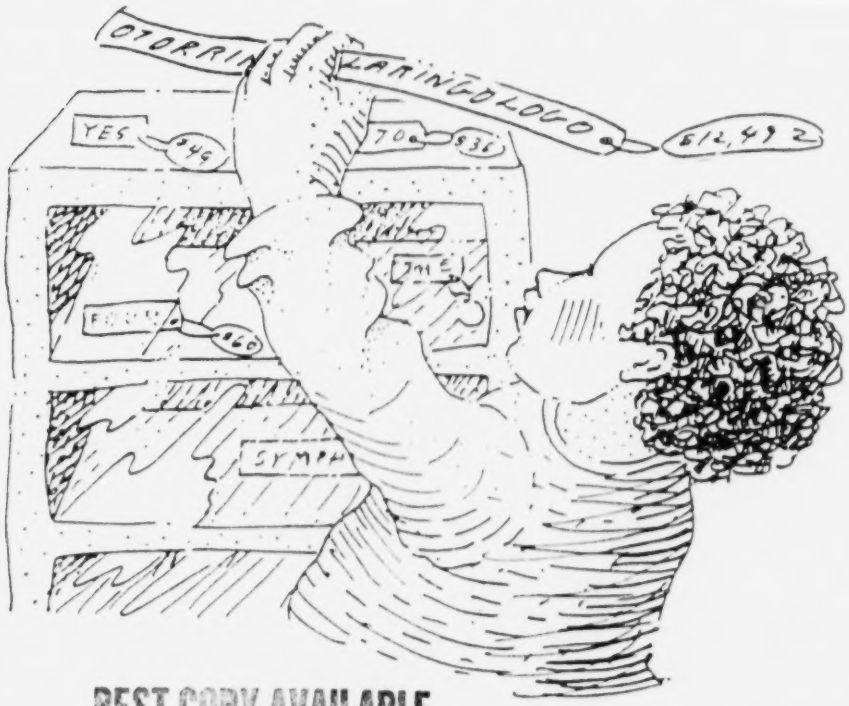
Nivel

Materiales

Papel

Lápiz

A = $ 1	N = $14
B = $ 2	O = $15
C = $ 3	P = $16
D = $ 4	Q = $17
E = $ 5	R = $18
F = $ 6	S = $19
G = $ 7	T = $20
H = $ 8	U = $21
I = $ 9	V = $22
J = $10	W = $23
K = $11	X = $24
L = $12	Y = $25
M = $13	Z = $26



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Create a Puzzle

Grade Level

TOOLS

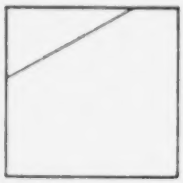
Scissors
Cardboard or
Heavy paper

Why

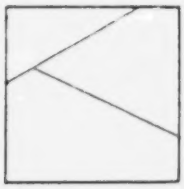
To explore the attributes of geometric shapes by building and solving a sequenced series of puzzles

How

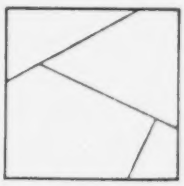
- ☐ Start with a square or any other shape you find pleasing.
- ☐ Make one straight cut in any direction. For example:

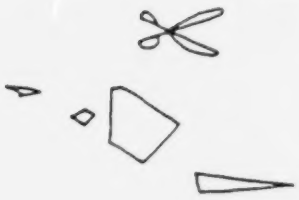


- ☐ Make a second cut. For example:



- ☐ Fit the three pieces together to make sure you can solve this puzzle.
- ☐ Make any third cut. For example:





- ☐ Practice with the four pieces, then give your puzzle to a friend to solve.
- ☐ Special Note: If you wish to make your puzzle a little easier to solve, color the backs of the pieces differently from the front.

E10

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FAMILY MATH PUBLICATIONS

FAMILY MATH is about helping people like and succeed at mathematics, especially parents and children working together. Many parents would like to help their children with mathematics, but don't know where to begin.

The FAMILY MATH book, also available in Spanish, provides activities appropriate for all ages--preschool through adult. Parents and children can explore at home such topics as:

- Measurement
- Logical Reasoning
- Geometry and Spatial Thinking
- Probability and Statistics
- Estimation
- Arithmetic

TABLE OF CONTENTS:

- A Mathematical Environment
- Beginning
- Word Problems and Logical Reasoning
- Measurement
- Numbers and Operations
- Probability and Statistics
- Time and Money
- Geometry and Spatial Thinking
- Patterns and Number Charts
- Estimation, Calculators, and Microcomputers
- Careers
- Organizing a FAMILY MATH Class
- Mathematics Generally Covered at Various Grade Levels
- Resource List for Parents and Teachers
- Addresses of Publishers

What parents and teachers say about the FAMILY MATH materials:

Having materials to work with my child on math in a positive atmosphere is the most valuable aspect for me.

The approach is what fascinates me most. Being able to visualize a problem does indeed take the sting out of math.

The book helped me remember some of what I forgot, but mostly it helped me to help my children without getting upset with them.

The FAMILY MATH film, WE ALL COUNT IN FAMILY MATH, is a 17-minute film showing scenes from several FAMILY MATH classes and the kinds of activities parents and children do together. Available for rental or purchase, in 16 mm film or video. Rental fee can be applied toward purchase price if purchased within 60 days of rental.

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FAMILY MATH/Nonpublic Schools
ORIENTATION MEETING, November 15, 1990

DATA FEEDBACK FORM

1. Please rate your overall reaction to today's Orientation Meeting by circling a number below:

1	2	3	4	5
POOR	BELOW AVERAGE	AVERAGE	GOOD	EXCELLENT

2. Please check to indicate specifically <u>why you liked this meeting</u> . . .(check all that apply):

_____ I received new information

_____ Some ideas I heard before were presented in new ways

_____ The presenters were knowledgeable

_____ The presenters were well-prepared

_____ The ideas presented were practical

_____ The ideas presented were exciting

_____ I obtained useful material

_____ I took away some ideas to try using immediately

_____ other; _____

_____

3. Please describe your immediate reaction to the ideas on which the Family Math Program is based.

4. In terms of your <u>best guess</u> at the present time, how interested are you in bringing the Family Math Program to your school?

1	2	3	4
NOT INTERESTED	NOT VERY INTERESTED	SOMEWHAT INTERESTED	VERY INTERESTED

Please explain briefly:_____

_____

(Turn Page Over)

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5. Please take a few moments to tell us what you want to know more about; what additional information would be useful to you; and/or who on our staff could be most helpful to you in thinking through your commitment to this Program.

6. What are the very next steps you need to take in order join the FAMILY MATH/Nonpublic Schools demonstration program? (Be sure to indicate who you might consult with, the arrangements that you might make, and so on. Be as specific as possible.)

The following questions ask for some background information about your school.

School Name:_____ Boro:_____

School grade range:_____ Average number of classes/grade:_____

Total student enrollment (est.):_____

Ethnic/racial characteristics:_____

Gender composition:_____

Percentage of families active in school affairs:_____

Your Name (print):_____

Your Title:_____

Thank you for completing this form. Please return it to Barbara R. Heller, Project Director, CASE, 25 West 43 Street, Room 300, New York, NY 10036.

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APPENDIX F

NPS Training Workshop Agendas, Materials, and Rating Forms

Day 1 Agenda F1
Day 2 Agenda F2
Day 1 Feedback Form F3
Day 2 Feedback Form F5
The Eye of Horus F7
What Is Family Math? F8
Principles Underlying Family Math F9
Planning Family Math Classes F10
Family Math Planning Sheet F11

New York City Nonpublic Schools
FAMILY MATH
January 9, 1991

Day 1

8:30 Registration, Coffee and Mathematics

9:00 Welcome and Introductions
Overview of Workshop
Model Class with break

11:00 Debriefing Class
Geometry

11:45 LUNCH

12:45 Openers
Careers

2:00 BREAK

2:15 Number
Logistical Information
Comments and Evaluation

3:30 The FAMILY MATH Day Ends

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New York City Nonpublic Schools
FAMILY MATH
January 10, 1991

Day 2

8:00 Coffee and Mathematics

8:30 FAMILY MATH Housekeeping
Fraction Kits and Cultural Connections
Jigsaw Learning

10:00 BREAK

10:15 Jigsaw Teaching
More Geometry

11:45 LUNCH

12:45 Just a Minute
Calculators
Planning
Create A Puzzle
Comments and Evaluation

3:00 The FAMILY MATH Inservice Ends

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Center for Advanced Study in Education
FAMILY MATH/Nonpublic Schools
WORKSHOP-Day 1, January 9, 1991

FEEDBACK FORM

1. Please rate your overall reaction to today's WORKSHOP by circling a number below:

1	2	3	4	5
POOR	BELOW AVERAGE	AVERAGE	GOOD	EXCELLENT

2. Please check to indicate specifically why you liked this workshop . . .(check all that apply):

_____ I received new information
_____ Some ideas I heard before were presented in new ways
_____ The presenter was knowledgeable
_____ The presenter was well-prepared
_____ The ideas presented were practical
_____ The ideas presented were exciting
_____ I obtained useful material
_____ I took away some ideas to use immediately
_____ Other; _____

_____

3. Please tell us which two ideas, concepts, or activities you found most useful.

_____

_____

4. Please tell us what was the least useful thing about today's workshop.

5. Please evaluate each of the following activities by circling the appropriate number: 1 means poor; 5 means excellent.

ACTIVITY	POOR		AVERAGE		EXCELLENT
Model Class	1	2	3	4	5
Geometry	1	2	3	4	5
Openers	1	2	3	4	5
Careers	1	2	3	4	5
Number	1	2	3	4	5

(Turn Page Over)

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6. At the present time, how interested are you in conducting the FAMILY MATH Program for the parents and children in your school?

1	2	3	4
Not At All Interested	Not Very Interested	Somewhat Interested	Very Interested

Please explain briefly:_____

_____

7. What additional support or information do you need to set up a FAMILY MATH Program in your school?

Please use the rest of this space for comments:

Your Name (print):_____

Your School:_____

Thank you for completing this form. Please return it to Barbara R. Heller, Project Director, CASE, 25 West 43 Street, Room 300, New York, NY 10036.

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Center for Advanced Study in Education
FAMILY MATH/Nonpublic Schools
WORKSHOP-Day 2, January 10, 1991

FEEDBACK FORM

1. Please rate your overall reaction to today's Workshop by circling a number below:

1	2	3	4	5
POOR	BELOW AVERAGE	AVERAGE	GOOD	EXCELLENT

2. Please check to indicate specifically why you liked this meeting . . .(check all that apply):

_____ I received new information
_____ Some ideas I heard before were presented in new ways
_____ The presenter was knowledgeable
_____ The presenter was well-prepared
_____ The ideas presented were practical
_____ The ideas presented were exciting
_____ I obtained useful material
_____ I took away some ideas to try using immediately
_____ Other; _____

_____

3. Please tell us which two ideas, concepts, or activities you found most useful.

_____

_____

4. Please tell us what was the least useful thing about today's workshop.

5. Please evaluate each of the following activities by circling the appropriate number: 1 means poor; 5 means excellent.

ACTIVITY	POOR		AVERAGE		EXCELLENT
Fraction Kits	1	2	3	4	5
Jigsaw	1	2	3	4	5
Calculators	1	2	3	4	5
Planning	1	2	3	4	5
Create A Puzzle	1	2	3	4	5

(Turn Page Over)

6. Please take a few moments to tell us what you want to know more about; what additional information would be useful to you; and/or who or what would be helpful to you in thinking through how you would conduct the FAMILY MATH Program at your school.

7. What are <u>the very next steps</u> you need to take in order to conduct the FAMILY MATH Program for the parents and children in your school? (Be sure to indicate who you might consult with, the arrangements that you might make, and so on. Be as specific as possible.)

Please use the rest of this space for comments:

Your Name (print):_____

Your School:_____

Thank you for completing this form. Please return it to Barbara R. Heller, Project Director, CASE, 25 West 43 Street, Room 300, New York, NY 10036.

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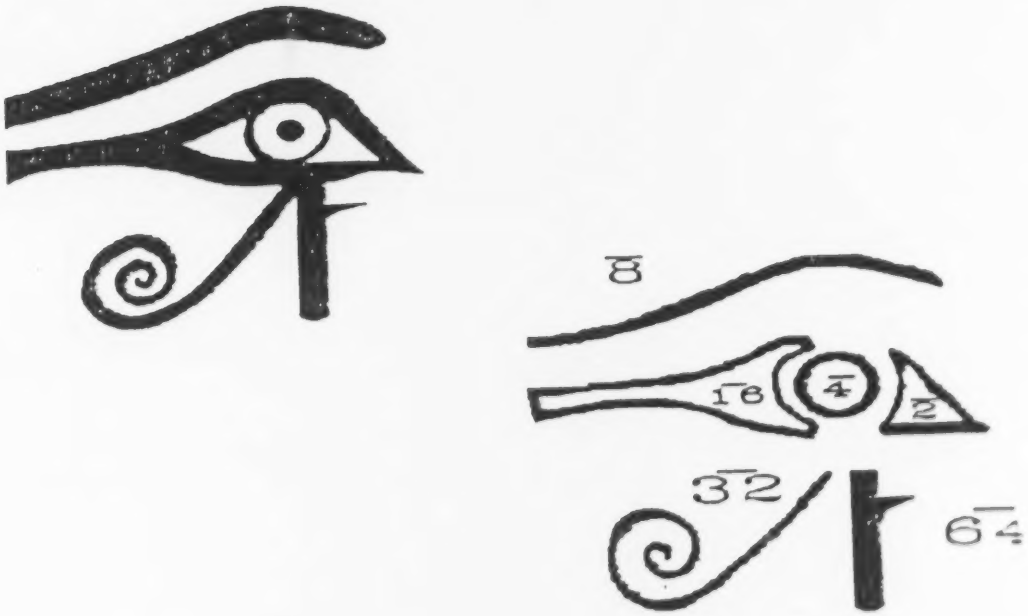
THE EYE OF HORUS

At first blush, the Eye of Horus is a heiroglyph of the all-seeing Eye of God; in fact, that is the translation. However, there is another symbolic meaning imbedded in this heiroglyph that demonstrates the diunital nature of Afrocentric science (e.g., the simultaneity of science and religion). The Eye of Horus is made up of six separate heiroglyphs representing the fractions: 1/2; 1/4; 1/8; 1/16; 1/32; and 1/64. The majesty of this symbolism is that these fractions sum to 63/64; the 64th part is the part of God that no human can manifest.



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For further information:

Gillings, Richard J. 1972. Mathematics in the Time of the Pharaohs. *Dover Publications. New York, NY.*

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It's parents and kids doing and learning math together
It's doing activities and playing games
It's using beans and buttons and pennies to solve math problems
It's organizing information in new ways
It's working and talking with others
It's sorting things and learning about logic
It's finding out that calculators can free our minds for solving harder problems
It's exploring shapes and geometry
It's estimating and developing number sense
It's finding that math is a TREASURE we all can share!

WHAT IS FAMILY MATH?

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PRINCIPLES UNDERLYING FAMILY MATH

FAMILY MATH has expanded exponentially since it began in 1981, which has been extremely gratifying. Now it's time to restate the underlying philosophy, so that FAMILY MATH can be clearly understood by new friends as well as old.

PURPOSE: FAMILY MATH is intended for families—it's not a tutoring or after-school enrichment program for children, nor is it a discussion group for adults. It's not remedial, although it may prevent the need for remedial courses. It is a time for parents and children to be together, involved in and enjoying mathematics.

MATHEMATICS: FAMILY MATH includes topics ideally found in the school math curriculum, especially those often not given priority in mathematics textbooks, such as probability, statistics, estimation, logic, geometry, and measurement. FAMILY MATH is more than computation, although the understanding of numbers and arithmetic is an important part.

PROCESS: The teaching emphasis in FAMILY MATH is *the doing* of mathematics. Time is not spent with worksheets or in a lecture format. Inexpensive materials of all kinds—beans, blocks, bottlecaps, toothpicks, coins--are used to help people figure out ways to solve problems. Children and adults come together once a week for several weeks, and then practice at home the ideas they learn in class. Families talk about the ways they are solving problems. In class, most activities are done in small groups with two or three families working together.

PEOPLE: There are two kinds of people who teach FAMILY MATH: those who teach a class where families come to learn (**FAMILY MATH instructors**), and those who present a workshop to prepare others to teach families (**FAMILY MATH workshop leaders**).

A **FAMILY MATH instructor** should be an enthusiastic and committed person who likes math and who likes people. Anyone who wants to teach FAMILY MATH should take the two-day workshop that includes materials, methods, and strategies for teaching FAMILY MATH classes,taught by a FAMILY MATH workshop leader. These workshops are offered all over the country by workshop leaders prepared by the Berkeley staff. A good mathematics background is helpful but not essential for a FAMILY MATH instructor, but an inexperienced mathematics person should team teach with someone confident in their mathematics ability, so that those who take the class will have the benefit of knowledgeable and enthusiastic instructors.

FAMILY MATH workshop leaders, those who teach others to give classes, have taught one or more FAMILY MATH classes themselves and have attended a FAMILY MATH staff development workshop at Berkeley or another site. Workshop leaders should definitely have a good background in mathematics, and, of course, have the same kind of enthusiasm, commitment, and liking for people and math that instructors need.

NETWORKING: FAMILY MATH is too good an idea to keep to yourself. We hope you will want to find others to work with you and to enjoy themselves as they become involved with families doing mathematics. The Berkeley staff is eager to help you spread the word about your program, so please keep us informed about your activities and how we might work with you.

Virginia Thompson
Director
(415) 642-1823

Mary Jo Cittadino
Network Coordinator
(415) 528-0560

Lawrence Hall of Science
University of California, Berkeley, CA 94720

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PLANNING FAMILY MATH CLASSES

1. What kind of classes will you do?

   Grade levels (limited spread is better)
   Size *(start small)*
   Where (classroom, auditorium, nonschool site)
   When (evening, after school)
   Who will teach (team plan and teacher, if possible)
   Duration and frequency (4-6 weeks, once a week)
   Babysitting (if provided; who, where)

2. How will you recruit parents?

   School flyers (reservations required?)
   PTA/SAC presentations (Double Digit, Strands, Balloon Ride, Useful Math Skills, etc.)
   Newspaper/radio/TV notices
   Word of mouth/telephone campaign
   Students recruit (via activities done in school)

3. How will you organize the classes?

   Strands vs. Mix
   Career Aspects (role models, activities, discussions)
   Stations and Leader Directed
   Accommodating different aged students
   Evaluation (every class or at end of series)

4. How will you obtain materials?

   Handouts ($3 to $5 per family for 6 week series)
   Task cards for stations and activities (who will prepare)
   Dice, rulers, scissors, marking pens, etc. (borrowed or purchased)

Tips for Conducting Successful FAMILY MATH Classes

Use name tags and attendance sheets.

Explain the philosophy the first class, and reiterate throughout.

Do not try to do too much. 4-6 activities/stations per class is sufficient.

Use only those activities you have tried yourself.

Explain the mathematics and skills that the activity addresses before and after the activity.

Allow parents/children time to learn and to do the activity.

Encourage questions and discussion.

Model and explain how to help others without "telling."

Remind adults to be patient.

For homework, assign activities done or taught in class.

Allow time at beginning of next class to discuss homework.

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Location of Inservice _____
Date _____

FAMILY MATH
PLANNING SHEET

Consider the information and materials presented in the FAMILY MATH inservice and how you can use them.

1) What I want to accomplish regarding FAMILY MATH:

2) During this school year I plan to:

3) Specific assistance/resources I need are:

Name(s):_____Phone: _____day _____evening

Grade level(s) _____

Home Address: _____
Zip Code

School:_____ District: _____

How would you describe the community where you plan to teach FAMILY MATH?

_____Few minorities; _____Less than half minority; _____More than half minority;

_____Nearly all minority

Which minority groups are represented in your community? _____

_____

If you already have a date set for a FAMILY MATH class, please indicate the dates, times, location, and instructor(s). Use the back of this sheet as necessary.

APPENDIX G

FAMILY MATH/NPS Observation Schedule; Teacher, Principal, and Parent Surveys

Observation Schedule G1
Family Math Teacher's Survey G3
Family Math Principal's Survey G8
Family Math Survey G12
Family Math Parent Survey G15

FAMILY MATH/NPS
Observation Schedule - 1990-91

School: Date:

Time (scheduled start time): _____ Actual start time: _____

End time: _____

Principal present: _____

Other **trained** teachers present (who): _____

_____

Other staff (specify): _____

Number of parents (total): _____

Number of Mothers: _____ Fathers: _____ Couples: _____

Number of children (total): _____

Grades represented: _____

Child care available: _____

Type of room: _____

Refreshments (specify): _____

ACTIVITIES (in order-specify who conducted activity):

MATERIALS USED (specify quantity):

PROBLEMS (describe-consider facilities, resources, number of activities, difficulty level, etc.):

Describe **PARENTS'** Reactions (use quotations, if possible):

Describe **CHILDREN'S** Reactions (quotations, if possible):

OBSERVER'S COMMENTS:

Family Math Teacher's Survey
FAMILY MATH/NPS, 1990-91

Dear Teacher: Now that the FAMILY MATH project is over and you've had some time to reflect upon it, we would like to know about your experiences and reactions. By answering all of the following questions you will help us make changes in the program. Your responses will be confidential and anonymous. Call me at 212/642-2910 if you have any questions or want more information. Thank you. Barbara R. Heller

1. Please rate the worthwhileness of the FAMILY MATH/NPS program (circle a number):

	Not at all Worthwhile	Somewhat Worthwhile	Worthwhile	Very Worthwhile
OVERALL:	1	2	3	4
FOR CHILDREN who participated:	1	2	3	4
FOR PARENTS who participated:	1	2	3	4

2. In your opinion as a FAMILY MATH teacher, what was the one best thing about the program (please be as specific as possible) _____

_____

In terms of the children?_____

_____

In terms of the parents?_____

_____

In terms of the school?_____

_____

For yourself?_____

_____

3. What one aspect related to each of the elements of the FAMILY MATH program listed below would you most want changed? (Please list and explain briefly.)

Training of FAMILY MATH teachers _____

_____

Operation of FAMILY MATH in the school _____

_____

Technical support provided by CASE _____

_____

4. From your point of view as a teacher, what is the single most problematic aspect of the FAMILY MATH program? _____

_____

5. Describe what kind kind of feedback, if any, you have received about the FAMILY MATH program from:

Participating children _____

Other children _____

Participating parents _____

Other parents _____

Other teachers in the school _____

School administrators _____

THE FOLLOWING QUESTIONS CONCERN THE ACTUAL OPERATION OF THE FAMILY MATH PROGRAM DURING 1990-91.

6. Describe the planning that went into your FAMILY MATH program in terms of:

   Who was involved? _____

   What topics and/or operations were discussed? _____

   _____

   Who had responsibility for assembling the materials? _____

   _____

   Who had responsiblity for the training of other professionals, if any? _____

   _____

7. Briefly describe how parent participants were recruited. (If available, please attach copies of letters to parents, etc.)_____

   _____

   What other or better ways are there to recruit parents? _____

   _____

8. What grade level(s) of children participated? _____

   What other grade level(s) would benefit? _____

   In your opinion, what is the optimal grade level for Family Math? _____

9. How many FAMILY MATH sessions did you hold? _____

   In your opinion, what is the optimal number of sessions? _____

10. What was the schedule of meetings (please specify date and time of each):

#1 _____ #4 _____

#2 _____ #5 _____

#3 _____ #6 _____

11. Approximately how many different families were involved? _____

Approximately how many families took part on a regular basis? _____

Of the total number of families, how many included fathers or male relatives? _____

12. Approximately how many different FAMILY MATH activities were done at each session?

_____

13. Which 3 activities did <u>you</u> like best?

_____, _____, _____

14. Which were the least successful activities?

_____, _____, _____

15. Did you use any of the FAMILY MATH activities/materials with your regular class?

__ No; if no, why not? _____

__ Yes; if yes, which did you use? _____

16. Approximately how much time did you spend preparing for a typical session, including the time spent making/assembling materials? _____

17. Have you discussed the FAMILY MATH program with:

other teachers in the school? __ No __ Yes

with people outside the school? __ No __ Yes

18. In your opinion, what is the biggest roadblock to implementing a FAMILY MATH program? _____

_____

19. Would you try another cycle of FAMILY MATH in the future?

_ No _ Yes _ Not certain

Please explain: _____

Please use the back of the page for additional comments or suggestions. Also note that CASE will be offering a 3-day training workshop on July 29, 30, and 31, 1991 for teachers who have had actual experience teaching Family Math to groups of parents and children. At this workshop, you can become a FAMILY MATH trainer and learn how to prepare other teachers to do a FAMILY MATH program. Call or write to me if your are interested in this unique opportunity.

(On July 1 and 2, CASE is offering a 2-day workshop to train new FAMILY MATH teachers. If you know of someone who would like to participate, ask them to call Barbara R. Heller at 212/642-2910.)

Return this completed form to Barbara R. Heller, 25 W. 43 St., Room 300N, NY, NY 10036.

Principal's Survey
FAMILY MATH PROJECT/NPS, 1990-91

Dear Ms. [redacted]: Now that the FAMILY MATH/NPS project is over and you've had a chance to reflect upon it, we would like you to share some of your experiences and opinions with us so that we may plan for the program's revision and complete our report to the advisors and to the funding agency. You can help by answering all of the following questions; be assured that your responses will be confidential and anonymous. Call me at 212/642-2910 if you have any questions or need more information. Thank you.

1. Please rate the worthwhileness of the FAMILY MATH/NPS program (Circle a number):

	Not at all Worthwhile	Somewhat Worthwhile	Worthwhile	Very Worthwhile
OVERALL:	1	2	3	4
FOR CHILDREN who participated:	1	2	3	4
FOR PARENTS who participated:	1	2	3	4
FOR TEACHERS who participated:	1	2	3	4

2. In your opinion as chief administrator, what was the <u>one best thing</u> about the FAMILY MATH program (please be as specific as possible)?

In terms of the children?_____

_____

In terms of the parents?_____

_____

In terms of the school?_____

_____

3. What one aspect related to each of the elements of the FAMILY MATH program listed below would you most want changed? (Please list and explain briefly.)

Training of FAMILY MATH teachers _____

_____

Operation of FAMILY MATH in the school _____

_____

Technical support provided by CASE _____

_____

Other (please describe) _____

_____

4. Briefly indicate what kind of feedback, if any, you have received from:

Participating teachers _____

Participating children _____

Participating parents _____

Describe what feedback, if any, you have gotten from:

Other teachers _____

Other children _____

Other parents _____

5. What is the single most problematic aspect of the FAMILY MATH program for you as an administrator? _____

_____

6. Did you have the necessary resources--people and materials--to implement the program adequately? _ Yes _ No; if no, please explain: _____

_____

7. Whether or not you plan to conduct another cycle of the FAMILY MATH program, in your opinion, what is the most advantageous:

   Number of sessions? _____

   Sequence (weekly, monthly, other)? _____

   Timing of sessions? _____

   Number of leaders? _____

   Types of leaders (classroom teachers, math teachers, parents)? _____

   Grade levels of students? _____

   Numbers of parent-child "teams"? _____

8. In your opinion, what is the biggest roadblock to implementing a FAMILY MATH program? _____

_____

9. Have you discussed your FAMILY MATH program with people outside your school?
___ No ___ Yes; if yes, specify who: _____

   What has been their reaction? _____

   Is there a school or group you would recommend take part in the upcoming year's FAMILY MATH program? (Specify.): _____

10. Do you think you will try another cycle of FAMILY MATH next year?

___ No ___ Yes ___ Not certain

Please explain: _____

Please use the rest of the space for additional comments or suggestions.

Also note that CASE will be offering another 2-day training workshop on July 1 and 2 to teachers and administrators (and others) interested in being a Family Math teacher. If any other of your teachers are interested, or if you know of people in other schools who may be, please have them call or contact me at 212/642-2910.

Return this completed form to Barbara R. Heller, 25 W. 43 St., Room 300N, NY, NY 10036.

G11

FAMILY MATH PROJECT/NPS
SURVEY

Dear colleague: Now that the 1990-91 school year is nearing the end, we thought this would be an appropriate time to ask about your reflections on and experiences with the FAMILY MATH program. By answering all of the following questions, you can help us make changes in the project so that it will be useful to schools in the future. Your responses will be confidential and anonymous. Please call me at 212/642-2910 if you have any questions or want more information. Thank you. Barbara R. Keller

1. What FAMILY MATH activities, if any, was your school involved with this year? Consider the following and briefly describe the activities that are relevant.

   Planning sessions:_____

   Review of the FAMILY MATH book:_____

   Compilation of materials:_____

   Assessment of parental interest:_____

   Orientation for parents:_____

   Orientation for teachers:_____

   FAMILY MATH sessions for groups of parents and children:_____

   _____

   Other; please describe:_____

   _____

   _____

2. Briefly indicate what kind of feedback, if any, you received from:

   teachers_____

   parents_____

   children, if applicable_____

3. In your experience, what is the major impediment to conducting a cycle of 4 to 6 sessions of a FAMILY MATH program for parents and children?_____

_____

_____

4. Did your have all of the necessary resources--people and materials--to implement the FAMILY MATH program?

___ Yes ___ No; if no, please explain:_____

_____

5. Did the teachers use any of the FAMILY MATH activities/materials with their regular classes? ___ No ___ Yes; if yes, which did they use?_____

_____

6. What one aspect related to each of the elements of the FAMILY MATH program listed below would you most want changed? (Please list and explain briefly.)

Training of FAMILY MATH teachers_____

_____

Operation of FAMILY MATH in the school_____

_____

Technical support provided by CASE (my organization)_____

_____

Other (please describe)_____

_____

7. What one thing pertaining to FAMILY MATH would you do differently if it were the beginning of the year and you could start over?_____

_____

8. Have your discussed FAMILY MATH with people outside your school?

___ No ___ Yes; if yes, specify who:_____

What has been their reaction?_____

9. Based on your experiences, please rate the worthwhileness of the FAMILY MATH program OVERALL. Circle a statement:

Not at all Worthwhile	Somewhat Worthwhile	Worthwhile	Very Worthwhile

10. Do you think you will try a cycle of FAMILY MATH next year?

___ No; why not?_____

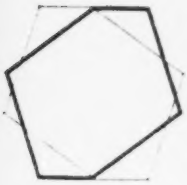
___ Not certain; what does it depend on?_____

___ Yes; please explain:_____

_____

Please use the back of the page for additional comments or suggestions. Also note that CASE will be offering another 2-day workshop to train new FAMILY MATH teachers on July 1 and 2. If you know of someone who would like to participate, ask them to call Barbara R. Heller at 212/642-2910.

Return this completed form to Barbara R. Heller, 25 West 43 Street, Room 300N, New York, NY 10036.



The Graduate School and University Center
of the City University of New York

Center for Advanced Study in Education
Graduate Center, 33 West 42 Street, New York, N.Y. 10036

Dear Parent:

We are asking you for some information about the FAMILY MATH program you took part in at [redacted] School. Please take a few minutes to answer the 7 questions and return it to us in the stamped envelop provided. If you want, you can write more on another piece of paper and include it. All your opinions will be confidential. If you have any questions, call Barbara R. Heller at 212/642-2910.

1. Please tell us the reason you and your child came to FAMILY MATH.

_____

_____

2. What was the one <u>best thing</u> about the FAMILY MATH?

_____

3. What was the one thing you <u>didn't like</u> about the FAMILY MATH?

_____

4. Did you do any of the FAMILY MATH activities at home with your child, or with any other children, family members, or friends?

___ No ___ Yes; if yes, who did the activities? _____

_____

If yes, which activities did you do? _____

_____

PLEASE TURN PAGE OVER

5. Circle a number to show how much you learned from FAMILY MATH:

1	2	3
I did not learn anything	I learned a little	I learned a lot

Please tell us one thing you learned:_____

_____

Now circle a number to show how much your child learned from attending FAMILY MATH

1	2	3
nothing at all	a little	a lot

Please tell us one thing your child learned:_____

_____

6. Please check if you think the FAMILY MATH Program helped you become:

	No	Yes
more informed about the school	___	___
better able to help your child with schoolwork	___	___
more able to help you child with math	___	___
more interested in how the school works	___	___
more familiar with the teachers and principal	___	___

7. Would you recommend the FAMILY MATH Program to a friend?

___ No ___ Maybe ___ Yes

Please explain why:_____

_____

APPENDIX H

Sample School Agendas

Immaculate Conception School H1
Holy Cross Parochial School H5

IMMACULATE CONCEPTION SCHOOL
378 East 151st Street
Bronx, NY 10455
(212) 585-4843
Sister Marcelene Riggin, SCC

February 14, 1991
Day 1
2:30 to 4:00 PM
Grade 3 PARENT/CHILD

LESSON PLAN	ACTIVITY	HANDOUTS
2:30 - 2:50	- BIRTHDAY CHART	Chart
	- JAR WITH PEANUTS IN SHELLS (Name on paper to estimate how many in the jar (73)	Jar
2:50 - 3:00	- Introduction	
	- Overview of Lesson and class	
3:00 - 3:35	- Discuss EVEN and ODD numbers	HUNDRED CHART page 20
	- Factors of numbers demonstrated with flash cards with numbers from 1 to 100.	FLASH CARDS
	- Circled PRIME NUMBERS and showed the flash cards to see the difference from composite numbers.	
3:35 - 3:50	BREAK (refreshments)	CALENDARS
	Parents/Children played game-CHANGE OF PACE	CHANGE OF PACE
		Dice
		Beans
3:50	EVALUATION	
4:00	Dismissal	

(over)

FEBRUARY 4, 1991 DAY 1

ATTENDANCE: 4 Parents with their child

EVALUATION:

- I liked working with my child
- I liked learning about Prime Numbers
- It was fun playing the games
- I remembered the factors of numbers
- I like the idea of the flash cards.

H2

IMMACULATE CONCEPTION SCHOOL
378 East 151st Street
Bronx, NY 10455
(212) 585-4843
Sister Marcelene Riggin, SCC

February 28, 1991
Day 2
2:30 to 4:00 PM
Grade 3 Parent/
Chil

LESSON PLAN	ACTIVITY	HANDOUTS
2:30	VALUE OF WORDS p. 33	Value of Words p. 33
2:45	ONE HUNDRED CHART	One Hundred Chart
	Discuss examples: 72 + 10 56 + 10 72 + 20 56 + 10 72 - 10 72 - 20 etc.	Multiplication Chart Addition Chart
	Recognize Patterns in numbers chart.	
3:10	PALINDROMES p. 216 and two other charts from 1991 Cuisenaire Co. of America, INC.	Cuisenaire papers Crayons
3:30	Break (Refreshments)	
	Parents / Children worked on handout sheets	
3:50	Evaluation	
4:00	Dismissal	

(over)

FEBRUARY 28, 1991 DAY 2

ATTENDANCE: 5 Parents with children (3 from Day 1 and 2 for the first time).

EVALUATION:

- We enjoyed doing the PALINDROME CHART.
- I learned something different about math that I never did when I was in school .
- I like learning PALINDROMES . It was something new to me and my daughter .
- I like the way I learn about the PALINDROME CHART . On t chart on the tables, I got a chance to use my head . With your help Leticia and I work at home with many different things - we add and subtract and even spell words .
- The PALINDROME CHART was very interesting to me. My memory was refreshed with the Time Table Chart .

FAMILY MATH CLASSES 2:30 to 4:00 PM

Day 1	February 14	Thursday	
Day 2	February 28	Thursday	
Day 3	March 21	Thursday	
Day 4	April 11	Thursday	
Day 5	April 18	Thursday	
Day 6	May 2	Thursday	(LAST CLASS)

FAMILY MATH ACTIVITIES

Week 1

Station Openers:
- Venn Diagram
- Graph
- Telling Time

Activities:
- Value of Words
- Double Digit
- NIM

WEEK 2

Station Openers:
- Venn Diagram
- Graph
- Egg Carton Numbers

Activities:
- Balloon Ride
- Find the Digits
- Rolling Records - Step I
- Target Addition

WEK 3

Station Openers:
- Tooth pick Units
- Egg Carton Numbers
- Venn Diagram

Activities
- Hundreds Chart
- Create a Puzzle
- Pentasquare Activities
- Rolling Records Step II

WEEK 4

Station Openers
- Venn Diagram
- Toothpick Units

Activities
- Rolling Records Step II
- Target Addition
- Making a Fraction Kit

WEEK 5

Station Openers
- Estimation Jar
- Tooth pick Activities
- Graph

Activities
- Two Bean Salad
- Ninety-Nine Chart
- Hurkle
- Target Addition

APPENDIX I

Evaluation Report

The Graduate School and University Center
of The City University of New York

Center for Advanced Study in Education
Institute for Research and Development in Occupational Education
33 West 42 Street, New York, N.Y. 10036
212 642 2942 FAX 212 719 2488

PARENT INVOLVEMENT: TRAINING TEACHERS TO FACILITATE QUALITY MATHEMATICS INSTRUCTION IN THE NONPUBLIC SCHOOLS IN NEW YORK CITY

EVALUATION REPORT

MILDRED K. LEE, Ed.D.

July 1991

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TABLE OF CONTENTS

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- o involve teachers and others in the conduct of FAMILY MATH programs at several NPS, and identify individuals who have potential to become trainers, and

- o provide schools and school systems with ongoing technical assistance and support needed to design, implement, and evaluate FAMILY MATH programs, and assist in institutionalizing these programs.

CASE managed the Project under the day-to-day administrative leadership of the Project Director, and the overall supervision of the Director of CASE. Guidance was obtained from an advisory group consisting of representatives of NPS organizations, the University Dean of Community Development, elementary school teachers, and parent involvement experts. This group had responsibilities for some governance functions, which included setting broad policy and assisting in program implementation, and planning for institutionalization of the Project.

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PARENT INVOLVEMENT: TRAINING TEACHERS TO FACILITATE QUALITY MATHEMATICS INSTRUCTION IN THE NONPUBLIC SCHOOLS IN NEW YORK CITY: AN EVALUATION REPORT

I. OVERVIEW

The purpose of this Evaluation Report, which covers the time period from 7/1/90 through 6/30/91, is to present, analyze, and summarize data based on operations of this teacher-training program.

This Project, funded under Title IIA of the Dwight D. Eisenhower Higher Education Act Competitive Inservice Grants Program, was planned and implemented as a consortium effort representing CASE (the Center for Advanced Study in Education) of The Graduate School and University Center of The City University of New York, the Conference of Public and Nonpublic Schools, the Committee on Nonpublic Schools, systems of nonpublic schools and the organizations that represent them, as well as nonpublic school teachers and administrators.

Using this collaborative approach, the Project utilized the FAMILY MATH curriculum to train middle-grade elementary school teachers in the nonpublic schools to work with parents and their children for specific purposes, which included:

- to improve children's mathematical skills, and
- to increase parents' understanding of math concepts in support of their children's learning.

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II. EVALUATION DESIGN AND GOALS

Both a summative and a formative evaluation were conducted to insure that the Project would grow and change as it progressed.

Formative evaluation aided the Project in progress and assured its personnel that goals were being met. It allowed the program staff to determine what was happening both positively and negatively, to modify and/or change what needed improvement, and to make additions to enhance the quality of what was good. This evaluation plan proposed that formative evaluation data be reviewed and analyzed, and that the findings be incorporated into the ongoing design, staff presentations, and overall program delivery.

Summative evaluation was included in the plan to "sum up" the Project's effectiveness in evaluation segments of formal reports.

The overall goals of the evaluation plan were designed to fulfill a conceptual need in terms of Project growth and change. For this reason, opportunities for commendations and recommendations were provided in order to make the ongoing program more effective for trainees.

It was consistent with the rationale of the evaluation plan that data be collected (e.g. participant feedback) to determine from "users" how well the Project was meeting its goals and participants' needs. These data measured and compared what was planned with what was being executed.

The goal of product evaluation was undertaken in order to:

- o refine the Project's format;
- o determine whether or not the Project's format was being used;
- o observe the extent to which the FAMILY MATH concept and principles were being used, and
- o assess whether or not the FAMILY MATH design could be applied in a variety of settings with different populations.

In this evaluation plan, product evaluation was sought mainly through site visits to demonstration schools.

Process evaluation was also a goal of this evaluation plan. Although processes are more difficult to assess, site visits to demonstration schools were used to observe interaction and dynamics related to the FAMILY MATH program.

In summary, the goals of the evaluation plan were to:

- o Measure the growth, ongoing change and responsiveness to change of the program, and measure changes in trainees' knowledge and skill attainment.
- o Develop instruments which gather data from participant sources (e.g. feedback forms).
- o Present data gathered in a formal format which emphasized effective aspects of the Project's implementation.

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III. RECRUITMENT AND ORIENTATION

A multi-faceted informational and promotional effort was undertaken by the Project:

- to recruit participants;
- to provide orientation for NPS administrators and plan the teacher-training component, and
- to enlist the cooperation of NPS administrators.

These recruitment and orientation functions were performed as outlined in the Project's proposal under "stage one," where

> "administrators, teachers and other representatives of NPS organiations and specific, interested schools will be introduced to parent involvement in mathematics and science programs in general and will learn about the FAMILY MATH program in detail." (p. 3)

Several developmental and sequential steps were followed to accomplish the mission involved in stage one of the Project:

1. A Project advisory group, consisting of representatives of the major religiously-oriented systems of schools, was formed, with the primary purpose of obtaining NPS administrative cooperation.

2. Notices about the Project and its FAMILY MATH teacher-training component were sent to all religiously-oriented elementary schools in New York City in early September 1990. The number and diversity of principals so notified were as follows:

No.	Affiliation
202	Agudath Israel and the Board of Jewish Education
150	New York Catholic Archdiocese
178	Catholic Diocese of Brooklyn
11	Greek Orthodox Archdiocese
541	Total

3. An invitational brochure was sent to all principals of religiously-oriented schools in New York City in early September 1990. This brochure announced an orientation meeting to be held on November 15,1990, and two days of FAMILY MATH

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teacher training scheduled for January 9 and January 10, 1991. Copy of this brochure appears on the following two pages.

4. An informational and promotional meeting was held on November 15, 1990 for school principals and other administrators, teachers, and parents. Its major purpose was to give orientation so that schools might decide whether to participate in the FAMILY MATH program as demonstration sites.

5. Followup letters and telephone calls were made to all schools expressing an interest in or inquiring about the FAMILY MATH program.

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Use this coupon to reserve a place at the afternoon ORIENTATION meeting; or call Barbara R. Heller or Ann Kelly at 212/642-2910.

Name: _____
Title: _____

School Name: _____
School Address: _____
_____
School Phone: (___)_____

Also hold a place for:

Name: _____
Title: _____

Name: _____
Title: _____

- o I would like more information about:
  - o FAMILY MATH
  - o The NYC Program
  - o other; specify: _____

- o We are interested in taking part in FAMILY MATH and will probably attend the January 9 and 10, 1991 TRAINING conducted by Virginia C. Thompson and project staff.

FAMILY MATH
for Nonpublic, Religiously-Oriented Schools in New York City

Barbara R. Heller, *Director*
Marjorie R. Hendler, *Consultant*
Virginia C. Thompson, *Founder and Director of FAMILY MATH*

Center for Advanced Study in Education
Graduate School and University Center of the City University of New York

25 West 43 Street
New York, NY 10036

212/642-2910

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FAMILY MATH:
A National Program

FAMILY MATH brings parents and children together to share mathematics.

Led by a trained teacher, administrator, interested parent, or other adult, FAMILY MATH sessions include small groups of parents and children. Sessions usually last two hours for 6-8 weeks and may be given in the afternoons or evenings at the convenience of the local school. Parents and children engage in interesting activities that reinforce basic mathematical concepts and skills.

Materials for FAMILY MATH

- are based on the school mathematics curriculum.
- are provided for use at home to create a family enjoyment of mathematics.
- emphasize a problem-solving approach.
- improve students' interest and motivation in math; and result in higher achievement.
- bring parents into the schools.
- stimulate teachers' ideas.

FAMILY MATH, developed at the University of California at Berkeley, is being used by schools in 30+ states and several foreign countries. Introduced to the New York City Public Schools in 1988, this is the first funded FAMILY MATH program available to the nonpublic schools.

FAMILY MATH: ORIENTATION
NOVEMBER 15, 1990

TRAINING OPPORTUNITY
January 9 and 10, 1991

On Thursday, November 15, 1990, CASE (the Center for Advanced Study in Education) is hosting an Orientation to FAMILY MATH for the nonpublic, religiously-oriented schools in New York City.

The opportunity to be part of this nationally-acclaimed program is available:

- to selected nonpublic schools, including those affiliated with Agudath Israel of America, the Board of Jewish Education of Greater New York, the Catholic Archdiocese of New York, the Catholic Diocese of Brooklyn, the Greek Orthodox Archdiocese, and others.

CASE will provide schools participating in this first demonstration with:

- teacher training, assistance with program implementation, and a small stipend to cover the costs of books and some materials.

Principals and other administrators, including math coordinators and curriculum specialists, as well as interested teachers and parent leaders are encouraged to attend the FAMILY MATH ORIENTATION:

- Thursday, November 15, 1990
- 1:30 - 3:30 p.m.
- The City University Graduate School and University Center
  33 West 42 Street (opposite The New York Public Library)
  New York, NY 10036
- Room 1700 B/C

RESERVE A PLACE EARLY FOR YOU AND YOUR STAFF.

The ORIENTATION will describe the FAMILY MATH Program; discuss how the program operates in New York City and elsewhere; and review the benefits for students, parents, teachers, and school organizations. There will be a question-and-answer period. Representatives from the systems of nonpublic, religiously-oriented schools will also be available.

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IV. PROJECT ADVISORY GROUP

As indicated earlier in this Report, a Project Advisory Group was set up with representatives of the major religiously-oriented systems of schools in New York City and others. Formation of this group was instrumental in gaining cooperation of the NPS for which the Project was intended.

Adhering to the Project's usual policy of ample advance notification about coming events, the Project Director solicited support from potential members of the advisory committee through mail dated May 17, 1990, and subsequent followup, for the first formal meeting to be held on September 11, 1990.

The well-organized and relevant agenda for the Advisory Committee's meeting appears on the following page.

In addition to the Project Director's cogent overview of the Project's goals and objectives, the agenda featured a presentation about FAMILY MATH by the Project's expert consultant on parent involvement programs.

Subsequent to this opening formal meeting, formal and informal discussions were held with the advisors, individually and as a group, to discuss a variety of issues, such as:

- o the need for programs involving parents in math education;
- o parent involvement programs currently in operation;
- o guidelines for school recruitment;
- o criteria for demonstration school sites, and

The Graduate School and University Center
of the City University of New York

Center for Advanced Study in Education
Graduate Center, 33 West 42 Street, New York, N.Y. 10036

AGENDA, September 11, 1990
ADVISORY COMMITTEE MEETING 10:00 - 12:00
Parent Involvement in Mathematics Education: Family Math

10:00 - 10:15	Welcome and Introductions	
10:15 - 10:30	Review of 1988-90 Project	Barbara R. Heller
10:30 - 10:45	Overview of Family Math Parent Involvement Program (1990-91) goals	Barbara R. Heller
	- November 15, 1990 Orientation - January 9-10, 1991 Training	
10:45 - 11:15	What is Family Math?	Marjorie R. Hendler
11:15 - 11:45	Immediate Implementation Needs	Barbara R. Heller Marjorie R. Hendler

- Up-to-date list of schools (with name of principal, addresses, and phone numbers).
- Publicity (general).
- Recruitment of principals, AP's, math supervisors and selected teachers for the November 15 orientation.
- Contacting the schools (letters, phone calls, descriptive brochure).
- Identifying schools to conduct Family Math programs.

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- o concerns about program implementation, e.g. lack of funds for substitutes to replace teachers-in-training; inability to hold evening meetings due to parent reluctance about being out at night.

Many opportunities were provided so that the Advisory Committee could assume and discharge its designated duties and responsibilities.

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V. ORIENTATION MEETING

An Orientation Meeting for principals, math coordinators and supervisors, and teachers was held on November 15, 1990 at the City University Graduate Center from 1:30 to 3:30 p.m. Copy of the invitational statement describing FAMILY MATH and the meeting's agenda appears on the following page.

The meeting was attended by 39 participants from 26 schools. It drew attendance from a widespread and diverse group representing a NYC population of principals, assistant principals, math coordinators, teachers, and some parents.

Twenty-one participants, representing 15 different schools, completed a Data Feedback Form, which provided valuable formative evaluation data for the Project Director and staff members.

Highlights obtained from the Data Feedback Form were as follows:

1. When asked to rate the Orientation session on a 5-point Likert-type scale where 1.0 = "Poor" and 5.0 = "Excellent," respondents gave a very favorable assessment of 4.4.

2. Specific ratings of individual characteristics were consistent with the 4.4 overall rating.

No. Rating	% Rating	Characteristic Rated
19	90.1	I received new information.
15	71.4	Some ideas I heard before were presented in new ways.
19	90.1	The presenters were knowledgeable.
20	95.2	The presenters were well prepared.
20	95.2	The ideas presented were practical.
19	90.1	The ideas presented were exciting.
17	80.9	I obtained useful material.
21	00.0	I took away some ideas to try using immediately.

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FAMILY MATH OPPORTUNITY

FAMILY MATH, an exciting new program that brings parents and children together sharing mathematics, is being offered to your school this year. Called the "most innovative, interesting project of the decade" by experienced educators, Family Math currently operates in 30+ states and in several countries. This is the first time Family Math is being made available to the nonpublic, religiously-oriented schools in New York City.

An **Orientation Meeting** for principals, math coordinators and supervisors, and teachers will be held on **November 15, 1990** at the City University Graduate Center in mid-Manhattan from 1:30-3:30 p.m. Family Math specialists will talk about the kinds of activities parents and children do; the dramatic benefits for children, parents, teachers, and schools; and how your school may take part in this special opportunity.

To reserve a place for you and/or a representative from your school (including parent leaders), call Barbara R. Heller or Ann Kelly at 212/642-2910.

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3. Typical responses listed by participants concerning their immediate reaction to the ideas on which FAMILY MATH is based were:

   "I think it is very practical."
   "Exciting." "Fabulous."
   "Interesting."
   "This program can only bring positive attitudes and results to the community."
   "Much needed program."

4. Based on the very positive responses to statements 1, 2, and 3, respondents stated, in most cases, that they were "very interested" in bringing FAMILY MATH to their schools.

5. When asked for immediate needs, most respondents commented about "ways to recruit families," "how to begin the program," and "excitement and anticipation" concerning more FAMILY MATH activities.

6. The most specific answer to this question about the very next steps needed in order for a school to join the FAMILY MATH/NPS demonstration program is quoted in its entirety.

   "The teacher who attended the Orientation meeting on November 15th will give her report to the faculty and to a meeting of the P.T.A. in order to generate interest. Next, a survey should be taken to see which parents and how many would be willing to participate. Teachers to attend the workshops would be selected. Question of funding would have to be addressed. The P.T.A. might be able to help."

From all comments on the Data Feedback Form, it was apparent that respondents reacted favorably to all aspects of the Orientation Meeting.

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VI. FAMILY MATH TRAINING

The second stage of the Project consisted of training for selected teachers and others in FAMILY MATH philosophy, principles, techniques, and activities.

An intensive 2-day training workshop was conducted by the founder of the national FAMILY MATH program on January 9 and January 10, 1991. During each workshop training period, participants from the demonstration schools were given didactic and experiential input on FAMILY MATH theory, principles, activities, and exercises, as well as practical hints concerning parent recruitment and resource materials.

At the outset, it was made clear to participants that CASE would work concurrently with school administrators and the trained teachers or facilitators to devise plans for implementing a FAMILY MATH program cycle.

Feedback forms, which were submitted at the end of each training day, provided a wealth of formative evaluation data related to the ongoing progress of the Project.

Data from the Feedback forms revealed the following:

1. On a 5-point, Likert-type scale where 1.0 = "Poor" and 5.0 = "Excellent," 21 respondents gave an overall rating of 4.6 on January 9th; 16 respondents rated 4.8 on January 10th.

2. Individual characteristics were rated consistently with the overall ratings described above. Specifically, the majority of respondents found that they "received new information," "obtained useful materials," got exciting and practical ideas from knowledgeable and well-prepared presenters.

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3. When respondents were asked to list two ideas, concepts, or activities they found most useful, typical responses were:

   "Word values, [illegible]..."
   "Two and three bean salads..."
   "Career stories."
   "Concept that math is fun and can be learned in fun and meaningful ways."
   "Calculator activities..."
   "Puzzle making..."
   "Fraction kits..."

4. When asked to tell what was the least useful thing about each workshop, most respondents left this blank or inserted a positive comment, such as "nothing should be changed," "more time needed to complete all the excellent activities," and "everything was useful." Several respondents referred to card cutting and number activities as "least useful."

5. When asked to evaluate the specific activities covered during each training period, respondents on January 9th gave an overall rating of 4.3; on January 10th, the rating was 4.6,

6. On January 9th, interest in conducting the FAMILY MATH program was very high, with most respondents circling "very interested" on the 4-point scale that began with 1= "not at all interested." This rating was consistent with that obtained from feedback forms completed at the Orientation Meeting.

   On January 10th, respondents were asked about information still needed. Most responses focused on "getting started," "setting up the first meeting," and "availability of the Project Director to make a P.T.A. presentation."

7. On January 9th, respondents were asked "What additional support or information do you need to set up a FAMILY MATH program in your school?" This question was similar to Question 6 posed on January 10th and described above. Responses on the 9th were somewhat tentative and uncertain, and became more directed and focused on the 10th. For

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example, several respondents were concerned with "the actual developmental progress from one week to the next..." "What sequence of events should occur?" "Should we follow the book or create our own schemata." Based on the January 10th responses, it would appear that respondents became clearer about their tasks as FAMILY MATH training proceeded.

On January 10th, respondents were asked to consider immediate next steps required to get FAMILY MATH started. Many respondents had specific ideas about these next steps which included administrative support, I.T.A. presentations, curriculum study using the FAMILY MATH text, and planning actual sessions.

As one respondent put it, "I think we're all set. Thank you."

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VII. FAMILY MATH SESSIONS IN THE DEMONSTRATION SCHOOLS

In the third and final stage of the Project, FAMILY MATH programs were carried out by facilitators in the demonstration schools and evaluated by CASE personnel through site visits.

CASE personnel worked with the demonstration schools to plan their FAMILY MATH program, which consisted of from 4 to 6 sessions for parents and their children during Spring 1991. CASE personnel assisted the trained FAMILY MATH facilitator to recruit parents, schedule meeting dates and times after school or on weekends, and plan session activities.

Demonstration schools were provided with a copy of the FAMILY MATH book, in both English and/or in Spanish, for the teacher to use in sessions for parents and their children. The Grant also paid for some miscellaneous materials needed for some FAMILY MATH activities (e.g. beans, dice), and also enabled CASE personnel to provide the demonstration schools with technical assistance and support during the conduct of FAMILY MATH sessions.

Despite the fact that many religiously-oriented schools operate under constraints imposed by their independent structure, small size, and/or fiscal limitations, FAMILY MATH was embraced by the demonstration schools as a way to enhance the traditional math curriculum and to foster parent-child math communication.

Demonstration schools set up FAMILY MATH sessions to which CASE observers were invited during Spring 1991. For each site visit, the CASE observer used a form - Observation Schedule -

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thereby facilitating notetaking and allowing each observer to direct attention to uniform aspects of the session, e.g. presence of principal, number of parents, number of children, grades represented, child care available, type of room, FAMILY MATH activities.

Typical FAMILY MATH sessions were organized by the demonstration schools into lesson plans. Two examples of plans appear on the following pages.

Following each visit, the CASE observer sent a post-observation note or letter which stressed many positive features of the session. In addition, one or two suggestions were included for making the sessions even more effective.

One such letter followed an April 1991 site visit; it contained the excerpt below:

> "In going to the schools, it has become apparent that a great deal of effort goes into preparing for a FAMILY MATH session - planning the activities and assembling the materials, in addition to publicizing the program and recruiting families... We were delighted that you were able to interest some parents in an after school program... It was clear...that the mothers did find it valuable and the children, too, seemed to respond positively. You might want to consider ways to increase parents' and children's interaction with one another as they do the exercises; young girls, especially, may need to be encouraged to take a more active role and many children have been brought up to defer to parents."

Another letter, following a March 1991 site visit, was quite laudatory and concluded by saying:

> "O. and you did an excellent job of training the

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IMMACULATE CONCEPTION SCHOOL
378 East 151st Street
Bronx, NY 10455
(212) 585-4843
Sister Marcelene Huggin, SCT

February 14, 1991
Day 1
2:30 to 4:00 PM
Grade 3 PARENT/CHILD

LESSON PLAN	ACTIVITY	HANDOUTS
2:30 - 2:50	- BIRTHDAY CHART	Chart
	- JAR WITH PEANUTS IN SHELLS (Name on paper to estimate how many in the jar (73)	Jar
2:50 - 3:00	- Introduction	
	- Overview of lesson and class	
3:00 - 3:35	- Discuss EVEN and ODD numbers	HUNDRED CHART page 1
	- Factors of numbers demonstrated with flash cards with numbers from 1 to 100.	FLASH CARDS
	- Circled PRIME NUMBERS and showed the flash cards to see the difference from composite numbers.	
3:35 - 3:50	BREAK (refreshments)	CALENDARS
	Parents/Children played game-CHANGE OF PACE	CHANGE OF PACE
		Dice
		Beans
3:50	EVALUATION	
4:00	Dismissal	

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FAMILY MATH ACTIVITIES

WEEK 1

Station Openers:

Venn Diagram
Graph
Telling Time

Activities:

Value of Words
Double Digit
NIM

WEEK 2

Station Openers:

Venn Diagram
Graph
Egg Carton Numbers

Activities:

Balloon Ride
Find the Digits
Rolling Records - Step I
Target Addition

WEK 3

Station Openers:

Tooth pick Units
Egg Carton Numbers
Venn Diagram

Activities

Hundreds Chart
Create a Puzzle
Pentasquare Activities
Rolling Records Step II

WEEK 4

Station Openers

Venn Diagram
Toothpick Units

Activities

Rolling Records Step II
Target Addition
Making a Fraction Kit

WEEK 5

Station Openers

Estimation Jar
Tooth pick Activities
Graph

Activities

Two Bean Salad
Ninety-Nine Chart
Hurkle
Target Addition

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other teachers. In fact, if I didn't know better, I would think they were at our 2-day training workshop. That's how well they seemed to understand the intent of the program!

"I also think you should be congratulated for devising the phase-in of grade levels. It's quite a creative plan and, with your continued support and dedicated staff, should be highly effective..."

"...you might consider spending more time on activities participants can do as they arrive - 'openers' - and on talking about what kinds of math each activity involved. That is, since the exercises tend to be so much fun, parents and children forget they are doing math...."

Parents from demonstration schools, who responded to the Project's questionnaire, indicated that the FAMILY MATH experience had been a good one for them and their children. Most parents stated that they had become more informed about and interested in the school and its personnel; in addition, they felt more able to help with their children's school work, especially in math. All respondents said they would recommend FAMILY MATH to a friend.

One parent's comment is quoted because of its special quality:

"It was a very positive learning experience for my son. I had to drag him to the first session (He was afraid he'd have homework!); but, at the last session, he was sorry it was over - he was having so much fun! He wanted it to continue all year! "

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VIII. POSITIVE ASPECTS OF THE PROJECT

There were many positive aspects attributable to the Project's conceptualization, organization, and operation. A followup survey conducted with NPS principals and teachers confirmed the Project's exemplary nature and overall effectiveness.

Among the most significant of the Project's strengths were:

- The consortium approach involving CASE and many segments of the NPS system generated a spirit of cooperation, collaboration, and mutual enthusiasm for the Project's success.
- FAMILY MATH - a mathematics-based program with a national reputation - was chosen as the curriculum for teacher training.
- The FAMILY MATH curriculum is consistent in philosophy and principles with current research on parent involvement, and, therefore, utilizes practical and pilot-tested strategies, techniques, and activities designed to improve children's mathematical skills and increase parents' understanding of math concepts in support of their children's learning.
- The Project set reasonable, attainable, and measurable goals, which were germane to programmatic intent and concept.
- An advisory group - representative of CASE, University, and NPS personnel - was formed with broad responsibilities for Project governance, policy making, program implementation, and future implementation.
- An able Project Director and competent support staff were responsible for day-to-day program implementation and managed all Project components so that goals and objectives were achieved.

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- A multi-faceted informational and promotional effort was undertaken to recruit participants, provide orientation for NPS administrators and plan the teacher-training component, and to enlist the cooperation of NPS administrators.

- Developmental and sequential steps were followed to initiate, implement, and maintain the stages envisioned by the Project.

- The Project followed orderly, organized, and carefully planned mailed notifications with followup letters and telephone calls.

- The Diocese of Brooklyn, Office of Catholic Education, offered professional development credit to all teachers who completed the 2-day intensive FAMILY MATH training workshops, thereby attesting to the excellence of the Project's teacher-training component.

- Formative evaluative data were collected, analyzed, and used in the ongoing planning of the Project (e.g. feedback forms).

- An intensive 2-day training period was used to present FAMILY MATH curriculum. Training was both didactic and experiential.

- School administrators and facilitators from the demonstration schools accepted the mandate that, concurrently with training, they would work with CASE personnel to implement a FAMILY MATH program cycle.

- FAMILY MATH programs were initiated and carried out by the facilitators from the demonstration schools and observed by CASE personnel.

- Followup surveys and questionnaires were utilized to obtain feedback from parents, principals, and teachers. Respondents reported highly favorable comments about their FAMILY MATH experiences.

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